THE POPULATION DEBATE: DIMENSIONS AND PERSPECTIVES

Papers of the World Population Conference

Bucharest, 1974

VOLUME II



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In the present publication, references to "China" are to be understood in the light of General Assembly resolution 2758 (XXVI) of 25 October 1971.

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PREFACE

The World Population Conference held at Bucharest, Romania, from 19 to 30 August 1974[1] was the third in a series of population conferences convened under the auspices of the United Nations The first two conferences, which took place in Rome in 1954 and in Belgrade in 1965, were purely professional in nature. The Bucharest Conference, convened under Economic and Social Council resolution 1484 (XLVIII) of 3 April 1970, reflected the increasing concern with population questions in the world today and was a global conference of Governments which devoted its attention to the national and international population policies and action programmes needed to promote human welfare and development.

Four United Nations symposia on population questions were held prior to the Conference, in which experts addressed themselves to the substantive aspects of the complex interrelationships between population and the multiplicity of socio-economic and other factors which affect it and are in turn affected by it. These were: the Symposium on Population and Development (Cairo, 4-14 June 1973); the Symposium on Population and the Family (Honolulu, 6-15 August 1973), the Symposium on Population, Resources and the Environment (Stockholm, 26 September–3 October 1973); and the Symposium on Population and Human Rights (Amsterdam, 21-29 January 1974). The reports of the symposia, which were before the Conference, form annexes I to IV to volume II of the present publication.

It will be noted that the topics of the four symposia went beyond what used to be called "formal demography". This was necessary in view of the crucial importance of population in development and also of the mutual relationship between man and his environment, a relationship which involves not only social and economic factors but cultural factors, family structure and human rights, as well as the physical environment.

[1] The *Report of the World Population Conference* will be issued as a United Nations publication under the symbol E/CONF 60/19.

It was also necessary to supplement the material of the four symposia in order to cover other aspects of population. For this purpose, background papers were prepared covering a variety of topics ranging from demographic analysis to research and training, biomedical aspects, ecological aspects, population policies and family planning These papers were made available to Governments prior to the Conference.

Digests of all of these papers—documents and reports of the symposia as well as background papers—were prepared in order to provide the participants in the Conference with concise summaries, corresponding to four of the items on the agenda of the Conference, namely, "Recent population trends and future prospects", "Population change and economic and social development"; "Population, resources and environment"; and "Population and the family".

In continuation of the tradition of publishing the papers of the United Nations world population conferences, the United Nations presents in *The Population Debate: Dimensions and Perspectives* all the substantive documents that were prepared for the World Population Conference, 1974, including the main conference documents and the background papers, as well as the documents and the reports of the four symposia. In addition, part one of volume I gives the text of the World Population Plan of Action adopted by the Conference

It is hoped that this collection of papers will, *inter alia*, serve the needs of the large number of professionals —not demographers only but also economists, sociologists, ecologists, medical scientists and others—whose interests cover population questions but who were unable to attend the Conference.

Acknowledgements are due to the large number of consultants and various United Nations offices and specialized agencies which helped the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat in preparing the documents, as well as to the United Nations Fund for Population Activities, whose grant made this publication possible

COMPOSITION OF THIS PUBLICATION

The papers of the World Population Conference, 1974, are published under the title *The Population Debate: Dimensions and Perspectives.* They are arranged in two volumes under the following headings:

Volume I

Part One.	The population debate: a digest
Part Two.	World demographic trends and prospects
Part Three.	Demographic data collection, research and training
Part Four.	Population and development

Volume II

Part Five.	Population, resources and the environment
Part Six.	Population and the family
Part Seven.	Population and human rights
Part Eight.	Family planning
Part Nine.	Population policies and programmes
Annex I.	Report of the Symposium on Population and Development
Annex II.	Report of the Symposium on Population, Resources and Environment
Annex III.	Report of the Symposium on Population and the Family
Annex IV.	Report of the Symposium on Population and Human Rights

The papers are reproduced in their original languages. They have been edited and consolidated in accordance with United Nations practice and requirements.

All general cross references to papers contained in these volumes are given in the following form:

Name of author, title of paper, *Population Debate*, vol. I or vol. II, part one, two, ... Specific references are to paragraph numbers, tables or figures in the paper cited.

CONTENTS

Volume II

Annexes

EXPLANATORY NOTES

The following symbols have been used in the tables throughout the report:

Three dots (. . .) indicate that data are not available or are not separately reported

A dash (—) indicates that the amount is nil or negligible

A blank in a table indicates that the item is not applicable

A minus sign (–) indicates a deficit or decrease, except as indicated

A full stop (.) is used to indicate decimals

A comma (,) is used to distinguish thousands and millions

A slash (/) indicates a crop year or financial year, e.g., 1970/71

Use of a hyphen (-) between dates representing years, e.g., 1971-1973, signifies the full period involved, including the beginning and end years.

Reference to "tons" indicates metric tons, and to "dollars" ($) United States dollars, unless otherwise stated.

Part Five

POPULATION, RESOURCES AND THE ENVIRONMENT

WILL THE EARTH'S LAND AND WATER RESOURCES BE SUFFICIENT FOR FUTURE POPULATIONS? *

Roger Revelle **

1. Human beings use both water and land for many purposes, but primarily for food production, that is, the transformation of matter and energy into a form that can be utilized for the growth and replacement of human tissue and the supplying of energy for human metabolism. Land is the primary resource required for food production, because of the dispersed nature of solar energy and of the low efficiency of photosynthetic conversion of solar energy into human food energy

2 With a high level of agricultural technology, such as that used in growing corn in Iowa (United States of America), photosynthesis from a human standpoint is about 0.4 per cent efficient, that is, the food energy contained in the humanly edible portion of the crop is about 0.4 per cent of the solar energy received on the planted area during the growing season

3. On average, the amount of solar energy received is $4\ 5 \times 10^7$ kilocalories/hectare/day, and the energy content of the food produced in an Iowa corn field is $4\ 5 \times 10^7 \times 0\ 004 = 1\ 8 \times 10^5$ kilocalories/hectare/day (1 kcal is the amount of heat required to raise the temperature of 1 kg of water 1° centigrade). Since only one crop is grown, with a growing season of about 4 months, this food energy must be divided by 3 to give the average daily production throughout the year. $1.8 \times 10^5 \times 1/3 = 6 \times 10^4$ kilocalories/hectare/day. A nearly minimum subsistence diet for human beings is about 2,500 kilocalories/person/day (the amount of heat energy which will raise the temperature of 2 5 tons of water 1° centigrade) Hence, the food energy required by 24 human beings can be provided from 1 hectare at a level of agricultural technology (and of purchased inputs, such as irrigation water, chemical fertilizers, high-yielding seeds, plant protection, farm tools and farm machinery) equivalent to that of corn farmers in Iowa. In terms of weight, the average Iowa corn crop is 250 bushels (14,000 lb) or about 6.4 metric tons (6.4×10^6 grams) per hectare Each gram of corn contains 3 5 kcal of food energy, and $6\ 4 \times 10^6$ grams/hectare $\times$ 3.5 kilocalories/gram $\times$ 1/365 days = 6.2×10^4 kilocalories/hectare/day, which checks the previous calculation. Each person requires the equivalent of 260 kg or about 570 lb of corn per year to meet his energy requirements

4. For the world as a whole, at the current time, 1 4 thousand million hectares are cultivated to provide the food, fibres and other agricultural products needed by 3 5 thousand million human beings. There is 1 hectare of farm land for every 2.5 living persons. Several reasons explain why the actual cultivated land per person is nearly 10 times this calculated minimum

(*a*) The land actually harvested during any particular year is from about one half to two thirds of the total cultivated land The remainder is in temporary fallow and temporary meadows for mowing or pasture, or is not cropped for some other reason When chemical fertilizers are not used, much farm land must lie fallow for a year or more to recover fertility,

(*b*) About 10 per cent of the cropped area is devoted to raising non-food crops, such as cotton, tobacco, rubber, coffee, tea and jute,

(*c*) Another large fraction is needed to produce food for livestock Some of the livestock are used in cultivating the farms The products from the remainder, including butter, eggs, milk and meat, are eaten by human beings Livestock are only 10-15 per cent efficient, that is, they use from 7 to 10 times as much food energy as the energy contained in their edible products,

(*d*) From 10 to 20 per cent of the food crops are destroyed by pests, and a small percentage is required for seed,

(*e*) The principal cause is the low level of agricultural technology in most of the world Instead of 6 4 metric tons per cropped hectare, the average Indian or Pakistani farmer produces only a little more than a ton of wheat or rice

HOW MUCH POTENTIALLY ARABLE LAND EXISTS ON THE EARTH?

5. Large areas of the earth's surface are not now cultivated, but could be if farmers and the necessary capital for development were available. In appraising the total quantity of arable land and its potential for [illegible]

irrigation; and the geographical distribution of currently

* The original text of this paper (E/CONF 60/SYM III/13/Rev 1) was submitted to the Symposium on Population, Resources and the Environment, Stockholm, 26 September-5 October 1973.

** Harvard Center for Population Studies, Cambridge, Massachusetts, United States of America

ultivated, but potentially arable, land in relation the geographical distribution of the world's popu- ion.

6. The area of potentially arable land is limited by:

(*a*) The climate, meaning that the land must be ost-free during the growing season;

(*b*) The physical characteristics of the land surface nd the top 2 or 3 feet of earth material beneath the rface. (This material is called "soil" when it consists f more or less loose aggregates of particles.) These racteristics are:

(i) Permeability to water and to plant roots. The oil is the medium or substrate that holds the plant oots, and the roots must be able to extract water and lant nutrients from the "soil solution", the liquid xisting in the interstices between solid particles. At e same time, it must be possible for water to pass hrough the soil and be drained off, carrying unwanted salts away in solution;

(ii) Water and nutrient-holding capacity. If the soil is too sandy or consists mainly of iron and aluminium hydroxides it will not retain water and plant nutrients will be washed out of it before they can be utilized by the crops;

(iii) The soil must be neither too acid nor too alkaline. Excessive acidity can usually be alleviated by adding lime, and alkalinity by washing the soil if drainage is available;

(iv) The surface must not be too steeply sloping or irregular;

(v) The soil must not be too rocky;

(*c*) The water-supply must be available during the growing season in amounts approximately equal to or greater than evaporation from the soil and transpiration from the plants.

Magnitude of climatic limitations

7. The land surface of the earth, outside the ice-covered areas of Antarctica and Greenland, contains 13 thousand million hectares. Of this total area, 1.9 thousand million hectares are non-arable, because temperatures below freezing occur during 9 or more months of the year. In an additional 2.6 thousand million hectares, there are less than 3 months of the year in which available moisture, either from rain and snow or from water stored in the soil, equals or exceeds evapotranspiration from plants and soil, and there are no feasible sources of irrigation water. Climate alone, therefore, limits the area of potentially arable land to 8.5 thousand million hectares.

Limitations due to physical character of the land surface

8. The following land and soil types, which overlap with the climatic limitations described above, contain large areas of non-arable land:

Land or soil type	*Non-arable area (thousand million hectares)*	*Reason for being non-arable*
Tundra	0.5	Too cold
Desert	1.9	Too dry, or too stony, rough and hard
Lithosol (rocky)	2.6	Too little soil; mostly rock
Regosol (sandy)	0.7	Too rough, unstable, and coarse-grained
Latosol (lateritic)	1.4	Becomes hard and impermeable after drying
Podsol (forest soils)	1.6	Too steeply sloping, thin, stony, or cold
All others	1.3	Too cold, undrainable, rough, thin, rocky, or steeply sloping
	10.0	

9. The remaining 3.2 thousand million hectares are arable. This is 24 per cent of the land area of the earth, about 2.3 times the currently "cultivated" area, and more than 3 times the area actually harvested in any given year.

Potential gross cropped area

10. Table 1 shows the total potentially arable land on each continent and the potential gross cropped area, that is, the sum of potentially arable areas multiplied by the number of four-month growing season crops that could be grown in each area, with and without irrigation. Without irrigation, three crops could be grown on 5 million km^2 in the humid tropics, and two crops on 6 million km^2 in subhumid regions. One crop could be grown without irrigation on 17 million km^2. Thus, the potential gross cropped area (the cultivated areas times the number of crops), without irrigation, is 45 million km^2. If enough water were available for irrigation, the gross cropped area could be as much as 72 million km^2. Irrigation is necessary to grow even one crop on 3 million km^2 of potentially arable land.[1]

Potential water-supply

11. The total amount of rain and snow falling on the earth each year is about 470,000 km^3; 370,000

[1] Roger Revelle and others, "Water and land", in United States of America, President's Science Advisory Committee, *The World Food Problem*, report of the Panel on the World Food Supply (Washington, D.C., Government Printing Office, 1967), vol. II, chap. 7, pp. 405-469.

TABLE 1 PROJECTIONS FOR LAND AND WATER DEVELOPMENT IN CERTAIN DEVELOPING REGIONS, 1962-1985

	Africa south of Sahara	*Asia and Far East*	*Latin America*	*Near East and North West Africa*	*Total*
1 Cultivated area					
In 1962 (millions of hectares)	152	211	130	70	563
In 1985 (millions of hectares)	189	223	169	78	659
Increase 1962-1985 (millions of hectares)	37	12	39	8	96
Increase 1962-1985 (percentage)	24	6	30	12	17
2 Gross cropped area					
In 1962 (millions of hectares)	64	211	71	39	385
In 1985 (millions of hectares)	99	269	102	50	520
Increase 1962-1985 (millions of hectares)	35	58	31	11	135
Increase 1962-1985 (percentage)	55	27	44	28	35
3 Gross cropped irrigated area					
In 1962 (millions of hectares)	1 1	49 5	8 2	12 8	71 6
In 1985 (millions of hectares)	2 1	102 7	16 2	17 8	138 8
Increase 1962-1985 (millions of hectares)	1 1	53 2	8 0	5 0	67 2
Increase 1962-1985 (percentage)	100	107	98	39	94
4 Costs of development (millions of 1970 dollars)					
Irrigation	893	23,095	7,259	4,944	36,191
Drainage and flood control	59	2,008	390	325	2,783
Development of new land not associated with irrigation	208	1,974	4,693	1,141	8,016
Total	1,150	27,077	12 342	7,547	48,116
5 Gross value of crop production					
1962 (dollars per hectare)	35 8	105 0	68 2	51 8	71 2
1985 (dollars per hectare)	58 4	237 1	105 1	103 0	136 1
Increase (percentage)	63	126	54	99	91
Total 1962 (10^9 dollars)	5 44	22 16	8 87	3 63	40 09
Total 1985 (10^9 dollars)	11 04	52 87	17 76	8 03	89 69
Increase 1962-1985 (10^9 dollars)	5 60	30 71	8 89	4 40	49 60
Increase 1962-1985 (percentage)	103	139	100	121	124
6 Population					
1962 (millions)	201	833	225	135	1,394
1985 (millions)	357	1,471	433	254	2,515
Increase 1962-1985 (percentage)	78	77	92	88	80

SOURCE Food and Agriculture Organization of the United Nations, *Provisional Indicative World Plan for Agricultural Development* (Rome, 1970), vol I, chap 2, pp 32-70

km^3 on the ocean and 100,000 km^3 on the land. Over the ocean, 9 per cent more water evaporates than falls back as rain This is balanced by an equal excess of precipitation over evaporation on land. Consequently, the volume of water carried to the sea by rivers and coastal springs (and in small part by glaciers) is close to 32,000 km^3 per annum About 18,000 km^3 are carried by 69 major river systems from a drainage area of 56 million square kilometres [2] Somewhat less than half the run-off of liquid water from the land to the ocean is carried by thousands of small rivers flowing across coastal plains or islands. The area drained is about 44 million km^2, but part of this is desert with virtually no run-off.

12 Inland seas, lakes, or *playas* receive the drainage from 32 million km^2. This includes most of the earth's 24 million km^2 of desert and also such relatively well-watered areas as the basins of the Volga, Ural, Amu Darya and Syr Darya rivers, which transport several hundred thousand cubic kilometres of water each year into the Caspian and Aral seas.

13. Irrigation agriculture represents man's principal deliberate use of water; currently, however, it takes little of the available supply A little over 1,000 km^3—less than 4 per cent of the total river flow—is used to irrigate 160 million hectares or about 1 per cent of the land area of the earth About 10 times this quantity of rainfall and snow-fall is evaporated and transpired each year from the remaining 1,250,000 hectares of the earth's cultivated lands and helps to grow food and fibre. Most river waters flow to the sea almost unused by man, and more than half of the water evaporating from the continents, particularly that part of the evapo-

[2] R Revelle, P Rogers and H Thomas, "Some international aspects of water resource development", in United States of America, State Department, *International Problems of Science and Technology* (Washington, D C, 1968)

on taking place in the wet rain forests and semi-
nid savannahs of the tropics, plays little part in
nan life.

4. The potential for irrigation development is, thus,
y large, but it is limited by the uneven distribution
river run-off between the different continents and
hin different climatic zones on each continent.
out a third of the total run-off comes from South
ierica, with less than 15 per cent of the earth's land
while Africa, which contains 23 per cent of the
yields only 12 per cent of the run-off. Run-off
om south-west Asia, North Africa, Mexico, the south-
stern United States, temperate South America and
tralia is less than 5 per cent of the total, yet these
gions contain 25 per cent of the land area (table 2).

15. As a result of the uneven distribution of run-off,
more than 30 per cent of the land that is potentially
able only with irrigation can actually be irrigated, and the potential increase of gross cropped area through irrigation development is limited to 1,110 million hectares. The total potentially arable land is, thereby, reduced to 2,925 million hectares and the potential gross cropped area to 5,562 million hectares (table 3). The distribution of potentially arable and gross cropped areas by continent is shown in table 4.

Some of the obstacles

16. What are the obstacles to the potential expansion of the earth's cultivated area? These obstacles are of several kinds, described below.

New technology needed for the humid tropics

17. Some 1.5 thousand million hectares of the potential cropped area lie in the humid tropics, where rainfall is more or less continuous throughout the year.

Table 2. Estimated river run-off and irrigation potential, by continent

Continent	Total area (million km^2)	Major drainage basins (million km^2)	Major river discharge (km^3)	Estimated total discharge (km^3)	Needed for full irrigation (km^3)	Potential gross cropped irrigated area with full irrigation (million km^2)	Potential gross crop irrigated area with available water (million km^2)
frica							
North Africa	8.5	3.0	80	90	[a]	[a]	.08
Tropical Africa	19.1	6.1	1,760	3,730	[a]	[a]	2.80
South Africa	2.7	0.5	10	30	[a]	[a]	.02
Total	30.3	9.6	1,850	3,850	15,500	11.60	2.90
sia							
Mainland East Asia	11.4	2.7	850	2,150	[a]	[a]	1.60
South-East Asia	4.5	1.5	830	2,200	[a]	[a]	1.65
Middle South Asia	6.8	3.5	1,530	2,250	[a]	[a]	1.70
South-West Asia	4.5	0.5	50	150	[a]	[a]	0.15
Total	27.2	8.2	3,260	6,750	8,400	6.30	5.10
ustralia	7.7	1.1	10	35	2,400	1.80	.02
urope	4.9	1.8	520	1,300	530	0.40	.40
North America							
Canada and Alaska	11.5	5.4	1,320	2,700	350	.25	.25
Coterminous United States of America, Mexico, Central America	10.3	4.8	910	1,900	2,480	1.85	1.35
Total	21.8	10.2	2,230	4,600	2,830	2.10	1.60
South America							
Brazil	8.5	7.4	5,940	7,000	65	.05	0.05
Other tropical	5.6	1.1	770	3,000	130	.10	0.10
Temperate	4.7	2.7	650	850	6,240	4.65	0.65
Total	18.8	11.2	7,360	10,850	6,435	4.80	0.80
USSR	22.4	13.5	2,760	4,600	400	0.30	0.30
World total	132.1	55.6	17,990	32,000	36,495	27.30	11.12

Sources: *Demographic Yearbook, 1969* (United Nations publication, Sales No. E/F.70.XIII.1); drainage areas and discharges of 69 major rivers: R. Revelle, P. Rogers and H. Thomas, "Some international aspects of water resources development", in United States of America, State Department, *International Problems of Science and Technology* (Washington, D.C., 1968); irrigation requirements for gross cropped areas estimated as shown in table 3 below; estimates of total water available made by comparing total areas of regions and area and discharge of major drainage basins within those regions.

[a] Data not available from author's computer print-out.

[b] Including China, Hong Kong, Macau, Mongolia, the People's Democratic Republic of Korea, the Republic of Korea.

TABLE 3 WORLD SUMMARY OF POTENTIAL NET AND GROSS CROPPED AREAS
(Millions of hectares)

	Current gross cropped area[a]	
(1)	Land potentially arable without irrigation	2,820
(2)	Land potentially arable only with irrigation	330
(3) = (1) + (2)	Total potentially arable (net cropped) land	3,150
(4)	Land potentially arable without irrigation outside humid tropics (technology must be developed for humid tropics)	2,320
(5)	Land potentially arable only with irrigation where sufficient water is available	107
(6) = (4) + (5)	Total potentially arable (net cropped) land outside humid tropics with sufficient water from precipitation or irrigation to grow at least one crop	2,427
(7)	Total irrigable area (land where at least one crop could be grown under irrigation, and sufficient water could be made available for this purpose)	1,027
(8)	Net "cultivated" area in 1964 (only about 65% cropped)	1,380
(9)	Net irrigated area in 1964	162
	Potential gross cropped area[a]	
(10)	Potential gross cropped area without irrigation	4,450
(11)	Potential gross cropped irrigated area with full irrigation (no water limitation)	2,730
(12) = (10) + (11)	Potential gross cropped area with full irrigation (no water limitation)	7,180
(13)	Potential gross cropped irrigated area with available water	1,112
(14)	Potential gross cropped non-irrigated area outside humid tropics (technology must be developed for humid tropics)	2,950
(15) = (13) + (14)	Potential gross cropped irrigated and non-irrigated area with present technology and available water	4,062

SOURCE Compiled from Food and Agriculture Organization of the United Nations, *Production Yearbook No. 18, 1964*, tables 1-3

[a] Gross cropped area is the cultivated area multiplied by the number of crops harvested during the year This number expressed as a percentage is called the intensity of cultivation

from each area For example, an area of 1 million hectares (1 mha), in which the air temperature remains above freezing and available water (including soil moisture) from either precipitation or irrigation exceeds potential evapo-transpiration at all times during the year, would be a potential gross cropped area of 3 million hectares In estimating water requirements

TABLE 4 POTENTIALLY ARABLE AND IRRIGABLE LANDS AND POTENTIAL GROSS CROPPED AREAS
(Millions of hectares)

Continent or area	*Potentially arable land*	*Potentially arable without irrigation*	*Potentially arable only with irrigation*	*Total irrigable area*	*Potential gross cropped area*		
					Without irrigation	*With full irrigation*	*With available water*
Africa	730	600	130	610	820	1,980	1,110
	(620)[a]	(490)	(130)	(610)	(500)	(1,660)	(790)
	[500][a]	[490]	[10]	[290]			
Asia	620	530	90	410	830	1,460	1,340
	(540)	(450)	(90)	(410)	(590)	(1,220)	(1,100)
	[465]	[450]	[15]	[335]			
Australia	150	120	30	110	150	330	152
	(150)	(120)	(30)	(110)			
	[122]	[120]	[2]	[2]			
Europe	170	170	—	30	230	270	270
	(170)	(170)	—	(30)			
	[170]	[170]	—	[30]			
North America	460	440	20	170	630	840	790
	(450)	(430)	(20)	(170)	(590)	(800)	(750)
	[450]	[430]	[20]	[160]			
South America	670	640	30	310	1,420	1,900	1,500
	(370)	(340)	(30)	(310)	(520)	(1,000)	(600)
	[370]	[340]	[30]	[80]			
USSR	350	320	30	30	370	400	400
	(350)	(320)	(30)	(30)			
	[350]	[320]	[30]	[30]			
WORLD TOTAL	3,150	2,820	330	1,670	4,450	7,180	5,560
	(2,650)	(2,320)	(330)	(1,670)	(2,950)	(5,680)	(4,060)
	[2,427]	[2,320]	[107]	[1,027]			

SOURCE United States of America, President's Science Advisory Committee, *The World Food Supply*, report of the Panel on the World Food Supply (Washington, D C, Government Printing Office, 1967), vol II, pp 432 433, and calculations from table 2

[a] Numbers in brackets are areas outside humid tropics with available water, those in parentheses are areas outside the humid tropics

No technology exists today for intensive cultivation of these lands for food production, because of the highly leached nature of the soils and their consequent inability to retain plant nutrients. Except for the island of Java and a few similar places, with very deep, recently formed volcanic soils, and for certain tree crops in other areas, farmers in the humid tropics must still practise the ancient technique of "slash-and-burn" agriculture. A new technology for intensive food production may require genetic development of food-producing trees, which can retain and recycle fertilizers in a carpet of organic matter on top of the soil.

18. The available evidence, especially from the impressive research in Central Africa, supports the prospect that, with the appropriate technological development, the humid tropics could have tremendous potential for food production. The Belgians, for example, before suspending their research in the Congo,[3] had developed an oil-palm which, when properly grown, yielded about 4,000 kg per hectare, whereas the ordinary palm yielded about 500 kg per hectare. In the humid Amazon Valley, peppers have been grown successfully by several colonies of Japanese immigrants for at least 20 years.[4]

Poor quality of much potentially arable land

19. The savannahs of South America and the broad belt that extends from east to west across Africa just south of the Sahara contain large areas of reddish-brown and yellowish-brown lateritic soils and latosols. These are among the most severely weathered and leached soils of the world.[4] Their meagre supply of plant nutrients is barely enough to support cropping for from 2 to 4 years, after which long periods—from 6 to 12 years or more of fallow—are necessary to restore their limited productivity. These soils are almost universally low in phosphorous and they have the unfavourable tendency of "fixing" phosphorous fertilizer and, thereby, making it unavailable to plants. On the other hand, many of them are permeable to both air and water, easily penetrated by roots to great depth, easy to keep in good tilth and have at least moderate water-holding capacity. With adequate irrigation water, chemical fertilizers and soil conditioners these soils could be made highly productive of a wide variety of food crops. In the northern part of the sub-Saharan region, large areas of regosols exist—sands which are highly susceptible to blowing and have such a low water-holding capacity that their potential for crop production is severely limited.

20. In other potentially arable lands, considerable soil improvement, e.g., by the addition of large quantities of lime, is necessary.

Large capital investment required

21. In general, any major extension of the earth's cultivated area, even for subsistence agriculture, would require a huge capital investment of the order of from $500 to $1,000 per hectare.[5] The cost of putting all the potentially arable land outside the humid tropics under cultivation would be from 500 thousand million to 1,000 thousand million dollars. The higher figure is about equal to the annual gross national product of the United States of America and twice that of all the less developed countries.

Uneven distribution of population and potentially arable land

22. Of the world's peoples, 70 per cent live in Asia and Europe, where nearly all the arable land is already cultivated, and the remainder can be brought under the plough only at the expense of large-scale irrigation development. The potential for increasing the net cultivated area is also relatively small in the Union of Soviet Socialist Republics. Most of the uncultivated, but arable, land is in the more sparsely populated continents.

23. In table 5, the quantity of potentially arable land outside the humid tropics, in which sufficient water is or could be made available on each continent, is compared with the currently cultivated area. Cultivated area means the lands designated by the Food and Agriculture Organization of the United Nations (FAO) as arable land and land under permanent crops, including land under crops, temporary fallow, temporary meadows for mowing and pastures, market and kitchen gardens, fruit-trees, vines, shrubs and rubber plantations. Within this designation, there are said to be wide variations within reporting countries. The area actually harvested during any particular year is from about one half to two thirds of the total cultivated land.

24. Human diets in Asia are barely sufficient today. If the Asiatic peoples are to obtain sufficient food in the future, it will be necessary to increase yields, that is, the weight of each crop per hectare of cultivated land, and, wherever possible, to grow two or three crops per year on each cultivated hectare. The climate in nearly all potentially arable, but currently uncultivated, land in Asia is so arid that even one four-month growing season is impossible without irrigation, and water-supplies are inadequate for more than about 15 million hectares (table 4). Within the currently cultivated area, double or triple cropping will usually require extensive irrigation development.

25. The largest areas of potentially arable land are in Africa and South America, which, outside the relatively small continents of Europe and Australia, have the smallest cultivated acreage. As table 4 shows, in these two continents, counting the humid tropic areas, there are nearly 1,300 million hectares of potentially arable uncultivated land with sufficient water (not much less than the total currently cultivated area of the earth) and only 240 million hectares that are cultivated.

[3] Now the independent State of Zaire.

[4] R. Revelle and others, *loc. cit.*

[5] Food and Agriculture Organization of the United Nations, *Provisional Indicative World Plan for Agricultural Development* (Rome, 1970), vol. I, chap. 2, pp. 37-70.

Table 5 Population and cultivated land on each continent, compared with potentially arable land

Region	Estimated population (millions) 1965	Estimated population (millions) 1985	Arable land (millions of hectares) Potential	Arable land (millions of hectares) Cultivated	Percentage of potential already cultivated	Cultivated area per person (hectares) 1965	Cultivated area per person (hectares) 1985[a]
Africa	310	515	500	160	32		' 0
Asia	1,855	2,700	465	470[b]	101	0 3	0 2
Australia and New Zealand	14	25	120	20	16	1.4	4 8
Europe	445	490	170	150	88	0 4	0 3
North America	255	330	450	240	53	0 9	1.4
South America	197	390	370	80	21	0 9	1.4
USSR	243	295	350	230	66	1 0	1.2
Total	3,320	4,745	2,425	1,350	56	0 4	0 5

[a] Assuming all potentially arable land is cultivated
[b] In Asia, some humid tropic land is cultivated (for example, in Java)

Outside the humid tropics, 630 million hectares with sufficient water remain uncultivated. The limiting factors in agricultural development in these continents are not natural resources, but economic, institutional and socio-political problems In addition to potential land in Africa and South America, over 300 million hectares of potentially arable, but not cultivated, land exist in North America and Australia

Necessity to improve level of agricultural technology

26 Raising the level of agricultural technology is essential to increasing the yields from cultivated land and to bringing many currently uncultivated areas under the plough. The basic requirement is creation of better conditions for market agriculture, as contrasted with subsistence agriculture, because higher agricultural technology depends upon the ability of the farmers and the food industry to purchase, and of society to produce, many "inputs", or factors of production from outside the farm A high degree of industrialization and of governmental and other institutional development is required. At the Iowa level of technology, energy must be used from fossil fuels equal to about three fourths the food energy in the crops [6] Table 6 shows how this energy is utilized

27. On the average, the less developed countries now use about 400 kg of coal equivalent per person per year, corresponding to an annual use of 3 million kcal per person. Thus, to meet his dietary needs adequately with high agricultural technology, a person in a less developed country would need to use for food production about one third of all the energy available to him. In contrast, the average person in developed countries uses 14 times as much fossil fuel energy as that required to meet all his agricultural requirements, even though the high proportion of animal product in his diet means that he is consuming from 3 to 4 times as many plant calories as the average person in a less developed country

[6] R. Revelle and others, *loc cit*, D Pimental and others, *Corn, Food and the Energy Crisis* (Ithaca, New York, Cornell University, Department of Entomology and Section of Ecology and Systematics, 1973)

Table 6 Estimated energy consumption from fossil fuels

(10^6 kilocalorie/ton of food grains[a])

		Energy consumption
(1)	Irrigation water	0 78[b]
(2)	Chemical fertilizers	0 71[c]
(3)	High-yielding seeds (varieties that are highly responsive to chemical fertilizers)	0 03
(4)	Plant protection against diseases and pests	0 01
(5)	Farm tools and farm machinery	0 44
(6)	Fuel for operating farm machinery	0 40
(7)	Scientific knowledge required for improved practices	—
(8)	Electricity	0 16
(9)	Transportation facilities (roads and trucks)	0 04
(10)	Crop drying	0 06
(11)	Storage and marketing facilities	0 01
(12)	Food-processing facilities (flour and sugar mills, food preservation plants etc)	0 22
	Total	2 86

[a] One ton of food-grains contains $3\ 5 \times 10^6$ kilocalories
[b] Assuming electric powered pumps, 0 6 metre evapo-transpiration, water pumped from 20 metres, 50 per cent water-course and field losses
[c] 130 kg of nitrogen, 34 kg of phosphorus, 70 kg of potassium per hectare

How many people could be fed?

28 Considering only currently available technology, the world areas of potentially arable net and gross cropped land outside the humid tropics are approximately 2,430 million and 4,060 million hectares, respectively

29. About 10 per cent of the gross cropped area will continue to be needed to grow fibres, beverages and other non-food products

30 With appropriate technology and sufficient purchased inputs of production (irrigation water, fertilizer,

high-yielding seeds, plant protection, farm tools, farm machinery and farming practices based on scientific knowledge) equivalent to those used in Iowa corn-farming, the remaining 3,650 million gross cultivated hectares could be made to produce:

$$6 \times 10^{3} \times 3.65 \times 10^{9} = 2.2 \times 10^{13} \text{ kilocalories per day}$$

31. Allowing 10 per cent of this amount for unavoidable losses, and another 3 per cent for seed, the remainder would be enough to provide a minimum subsistence diet of 2,500 kilocalories per day for 7.6 thousand million people.

32. To provide an adequate diet, including sufficient high-quality protein (protein with the balanced content of amino acids required by human beings and all other warm-blooded animals, except cattle and related ruminants) and "protective" foods, such as fruits and vegetables, the equivalent of from 4,000 to 5,000 kilocalories person day is desirable. The potential gross cropped area would be sufficient for from 38 thousand million to 48 thousand million people—from 10 to 13 times the current population of the earth.

Potential and reality

Expansion of cultivated area versus multiple cropping and raising of yields

33. During the first 10 years after the Second World War, the net harvested acreage in Asia (excluding China) increased about 2 per cent per annum. After 1957-1958, however, the rate of increase was only about 1.4 per cent per annum. While the rate of population increase accelerated, the rate of increase of harvested areas declined. This situation may have been related in part to the very low level of expenditure on water resources development, less than $2 per year per person, as well as to the relative scarcity of uncultivated land that could be cultivated.[7]

34. The rate of increase of cultivated areas was even lower in Africa than in Asia; it was higher in South America, averaging 3 per cent annually from 1950 to 1965 and nearly 4 per cent during the 1960s.[8] On a world-wide basis, if population growth were to be matched by increases in cultivated area, annual *per capita* expenditures on water and land development would have to increase from two to four times.

35. For the next 20 or 30 years, a combined strategy for the less developed countries of increasing both multiple cropping and total cultivated area, as well as yields from each gross cropped hectare, has been recommended by FAO.[9] Table 1 shows that with a total expenditure of 48 thousand million dollars, the gross value of crop production could be increased over all by 124 per cent with a 17 per cent growth in the cultivated area and a 35 per cent growth in gross cropped area between 1962 and 1985, in four developing regions: Africa south of the Sahara; the Near East and North-west Africa; Asia and the Far East; and Latin America. China and other centrally planned economies were omitted from the study summarized in table 1; but, even so, it covered a 1962 population of 1,394 million people, 44 per cent of the world population. The population of the study region was estimated to rise to 2.5 million by 1985, an 80 per cent increase. Thus, the 124 per cent projected over-all increase in food production would be well ahead of population growth for the next 20 years.[10] Population and food supplies run a close race only in Latin America. In this regard, the FAO Provisional Indicative World Plan states:

> "The correct degree of emphasis on expansion of the cultivated area versus higher productivity from existing areas in Latin America would seem to depend in great part on the rate at which food demand will rise. If income elasticities (for food) are low in some South American countries, as data at the disposal of FAO would seem to show, emphasis should be placed on a much faster growth of industrial goods and services than of food. The correct policy would then be to concentrate on modernization of agriculture through increased inputs and better techniques and a faster movement of the labour force out of agriculture to produce the goods and services in high demand. Forest-based industrialization can be developed so as to play a substantial role in bringing about the restructuring of the economy. A corollary is that investment in the non-agricultural sector must be sufficient to employ these people and produce these goods."[11]

Conflicts in water use

36. It has been tacitly assumed that all river run-off available for human use could be allocated to irrigation agriculture. But cities and their industries are also consumers of water. In India, for example, the Irrigation Commission[12] estimates that 17 per cent of the usable water will be needed for industrial and municipal use, leaving a total of 720 thousand million m^3 for irrigation (out of a total estimated annual river flow of 1,800 thousand million m^3 = 1,800 km^3 = 1.8×10^{12} m^3). The Commission's estimate of 7,600 m^3 for irrigating one cropped hectare does not appear to have taken water losses sufficiently into account.

[7] *Ibid.*

[8] *Ibid.*

[9] Food and Agriculture Organization of the United Nations, *op. cit.*

[10] The principal capital investment in the Plan for all four regions would be for the expansion of the irrigated area: over all by 94 per cent, ranging from 39 per cent in the Near East and North-west Africa to 107 per cent in Asia and the Far East. Chemical fertilizers, which are effective in raising yields primarily in irrigated lands, could thus be used over a much larger area in 1985 than in 1962.

[11] Food and Agriculture Organization of the United Nations, *op. cit.*

[12] Government of India, Ministry of Irrigation and Power, *Report of the Irrigation Commission, 1972* (New Delhi, 1972), vol. I, chaps. III and X, pp. 41-58 and 201-246.

Hence, their estimate of a total water use of 616 thousand million m^3 for irrigating some 80 million gross cropped hectares is probably low, and there may ultimately be a serious conflict for water between agricultural and industrial and municipal users

37 Thailand's primate metropolis, Bangkok-Thon Buri, gives another example. The city's population is growing at between 5 and 6 per cent per annum, and the country as a whole at about 3 per cent, doubling in around 23 years. The metropolitan water-supply comes from two sources. wells under the city and a diversion point on the Chao Phraya river some 30 km to the north [13]

38 With the rapid increase in food demand, caused by population growth and rising incomes in Thailand, more and more of the Chao Phraya waters are being used for irrigation agriculture above the city's diversion point. During the low-flow season, the volume of fresh water remaining in the river, even when supplemented by water pumped from wells under the city, is not much more than that required for municipal use by the current population of Bangkok The water-table under the city is being lowered by the pumping, and there is danger of subsidence and of salt-water intrusion into the river and the underground aquifer.

39 The problem of water quantity for both the city and the farmers could probably be solved by constructing up-stream dams and reservoirs to augment the low flow and by digging tube-wells in the agricultural areas, which could be used instead of the river as a source of irrigation water during the dry season The aquifers supplying these tube-wells would be recharged during the monsoon

40. An intrinsic feature of the Aswan High Dam in Egypt is that the water can be used for another principal purpose besides irrigation agriculture—hydro-electric power The annual amount of electric energy that can be produced by the generators and turbines of the dam was planned as about 10 thousand million kilowatt hours This would approximately double the electrical energy now available to Egypt To use this energy effectively for industrial development, it must be generated at the times and in the amounts needed Because most industries need to operate at a fairly steady rate throughout the year, their electric-power requirements are about the same during each season

41. In contrast, agricultural needs for water vary widely from one season to another. Because air temperatures are higher and there is more sunshine in the summer, crop plants transpire to the atmosphere between two and three times as much water in summer as in winter. If about the same area of land is cultivated through the year (such intensive cultivation not only is traditional in Egypt, but is essential for efficient agriculture), the amount of water required for irrigation will be much higher in the summer than in the winter

[13] P. Cheosakul and B Indranparan, personal communication to the author, 1971

42. If water is released from the dam in such a way as to provide optimum economic benefits for agriculture, the large variations from month to month in the rate of generation of electric power are far from optimum for industry On the other hand, if the water is released in accordance with the needs for electrical power, there is too much water for agriculture in fall and winter, and not enough in the summer.

43 A preliminary analysis [14] shows, however, that the dam is well adapted to multiple use, that is, it could effectively satisfy a relatively high proportion of the needs, both for irrigation water and for power, if the river water could be used conjunctively with ground water in Lower Egypt, from Cairo through a large part of the delta, where there is an enormous reservoir of fresh underground water equal in volume to several years flow of the Nile Such a combined use of surface and underground water would also allow the farmers greater flexibility in the timing of irrigation, facilitate the maintenance of the water-table at the proper level to minimize evaporation loss and salination and make it possible to irrigate lands above the level of canal commands

Conflicts in land use

44. In regions of traditional nomad grazing, such as the north-west frontier of Pakistan and the sub-Saharan savannah belt of Africa, the establishment of modern high-intensity agriculture encounters severe difficulties, both from the cultural patterns of the people and from the conflicting needs of cattlemen and farmers for land Forest industries and agriculture also conflict in ways that may have serious economic consequences. A large fraction of the currently uncultivated land is now covered by forests The clearing of the forests for low-yielding, subsistence agriculture may represent a serious economic loss.

45 Many major irrigation projects involve the construction of large high dams and reservoirs behind them These reservoirs commonly flood valuable river-bottom lands which have high actual and potential agricultural value The problems of resettling the agricultural peoples displaced by the reservoirs have not been completely solved in any country.

46 The growth of cities commonly utilizes prime agricultural land Fortunately, the total area of cities is small, usually less than 5 per cent of the land area of even a highly urbanized country

Effects of differential agricultural development

47 The new agricultural technology is much better suited to some regions than to others. For example, in India, irrigation development is easy to accomplish in the Ganga plains of Uttar Pradesh and Bihar; it is difficult and expensive in most of the Deccan plateau, which covers central India. National farm prices will

[14] H A Thomas, Jr, and R Revelle, "On the efficient use of High Aswan Dam for hydropower and irrigation", *Management Science*, vol XII, No 8 (April 1966), pp B296-B311

almost certainly fall because of greatly expanded production in the regions in which the new technology can be successfully applied. The farmers in the less favoured regions may then be unable to sell their crops at prices sufficient to pay for the water, chemical fertilizers and other inputs needed for high-productivity agriculture. They will be forced back to subsistence farming, but this will be insufficient to feed the growing populations of their own villages. Large numbers of poverty-stricken and unskilled countrymen will be driven out, either to cities and towns or to the more favoured agricultural regions, where most of them will become landless labourers. The challenge to policy-makers, either to develop new agricultural technologies for non-irrigated land, or to provide employment and a new way of life for these people, is very great, especially because of the difficulties of raising employment in the industrial sector as fast as the labour force grows. [15]

Potential irrigation development in India

48. The Indian Irrigation Commission estimated that 84.2 million gross cropped hectares could ultimately be put under irrigation in India. The area under irrigation would be about 50 per cent of the net cropped area, leaving around 69 million hectares unirrigated. The Commission's estimated cost for future irrigation development was Rs. 3,000 per net irrigated hectare, or a total of approximately Rs. 100 million ($14 thousand million); and they believed this development could take place in the next 30 years. The current gross cropped irrigated area would be increased by 158 per cent, or 51.6 million hectares.

49. The data given by the Commission indicate that yields of human food per crop on irrigated land in India are equivalent to 2 tons of food-grains per hectare (7×10^6 kcal). This is more than twice the yield on unirrigated land. Current yields of cotton are 350 kg per hectare on irrigated land, and about 100 kg on unirrigated land. With the current cotton yields and a cotton demand of 2.5 kg per person per year, the Indian population of 900 million, assumed by the Commission in the year 2000, would require 2,250,000 tons of cotton, and 6,400,000 hectares of irrigated land would need to be allocated to cotton production.

50. Assuming current food yields, the remaining 147 million gross cropped hectares could produce the equivalent of 225 million tons of food-grains. Subtracting 13 per cent for seed, feed and wastage, 196 million tons could be available for human consumption, giving an average daily diet of 2,100 kcal per person per day, about the same as the current diet, for 900 million people. Unfortunately, with the current rate of population growth in India (2.2 per cent per annum), this population would be attained in 1992-1993, seven years before the terminal date of irrigation development set by the Commission. Continuance of a minimum diet for the majority of the population would minimize the prospects for socio-economic development, and hence, for a reduction in fertility rates. The future for the next generation would be bleak.

51. On the other hand, if socio-economic development can occur, based on increased agricultural productivity, powerful forces for fertility reduction could be set in motion and population growth could gradually be brought to a halt. If, for example, a population of 1.2 thousand million is assumed during the first half of the twenty-first century, together with yields equivalent to 6 tons of food grains and 500 kg of cotton per gross cropped hectare of irrigated land, and 1 ton of food-grains per hectare on unirrigated land, then the average diet could be greatly improved. Yields of this magnitude have already been attained in Egypt and in some other less developed countries. [16]

52. The total plant energy available for the average Indian diet would be the equivalent of about 3,700 kcal per person per day (assuming an increase in cotton demand to 3 kg per person per year). This would allow *per capita* consumption of around 25 grams of animal protein from milk, eggs and poultry, nearly half the average daily protein requirement [17] and an average dietary energy content of 2,400 kcal. [18] This amount is 200-300 calories more than the current rate—the increase would be required because of the declining proportion of children, as birth rates decline.

53. Such a transformation of Indian agriculture would not be constrained by a lack of water and land resources, but by the levels of knowledge and incentives that could be made available to the farmers, the quantities of capital and the institutional changes that could be devoted to agricultural development and, possibly, by the future availability of energy resources. Even if the total capital requirements were three times those estimated by the Irrigation Commission, the

[15] National Academy of Sciences, *Rapid Population Growth: Consequences and Policy Implications* (Baltimore, Maryland, Johns Hopkins Press, 1971), vol. I, chap. 4.

[16] D. Pimentel and others, *op. cit.*

[17] G. A. Goldsmith and others, "Population and nutritional demands", in United States of America, President's Science Advisory Committee, *The World Food Problem*, report of the Panel on the World Food Supply (Washington, D.C., Government Printing Office, 1967), vol. II, chap. 1, pp. 5-135.

[18] The method of calculation may be illustrated by supposing that all animal protein comes from cow's milk. One kilogramme of milk contains 35 grams of protein and has an energy content of 650 kcal; see B. K. Watt and A. L. Merrill, *Composition of Foods*, Agricultural Handbook No. 8 (Washington, D.C., United States Department of Agriculture, 1963), p. 63. Then, 25 grams of protein and 465 kcal are contained in 715 grams of milk. Dairy cows are about 23 per cent efficient in converting plant protein and energy into milk protein and energy; see G. A. Goldsmith and others, "Increasing high quality protein", in United States of America, President's Science Advisory Committee, *The World Food Problem*, report of the Panel on the World Food Supply (Washington, D.C., Government Printing Office, 1967), vol. II, chap. V, pp. 299-371. Hence, 465 kcal of milk correspond to 2,000 kcal of plant energy, and 2,000 kcal plus 2,400, minus 465, equals 3,935 kcal per person per day of primary plant food energy. Since part of the animal feed would be the humanly inedible portion of the crop, it may be estimated that about 3,700 kcal of humanly edible food per person per day is the basic plant energy available in an India of 1.2 thousand million people, with a modernized agriculture using 1970 technology.

needed annual investment would be only about 2 per cent of the current gross national product of India.

Agricultural development in Bangladesh

54. A more serious situation can be projected for Bangladesh. Careful studies by the International Bank for Reconstruction and Development and the Harvard Center for Population Studies [19] have shown that with a total new capital investment of Rs 7 9 thousand million ($1,780 million), yield of food-grains on 8,940,000 net cultivated hectares could be more than doubled during the next 20 years, to 2 5 tons per net hectare. Allowing for seed, feed and wastage, the annual rice and wheat production available for human consumption would be about 20 million tons, barely enough, since food-grains constitute about 82 per cent of the energy content of the diet, for a minimum diet for the 134 million people anticipated in 1993 (with a rate of natural increase at that time of 2 5 per cent per annum) Modernization of agriculture, near to the levels that were described earlier in this paper, might allow another doubling of food-grain production, perhaps to 40 million tons; but self-sufficiency in food production could not be long sustained in the face of continuing population growth The problem is urgent and potentially tragic. Both agricultural development and industrial development for exports to pay for food will be necessary, possibly combined with out-migration on a large scale

Sub-Saharan Africa

55 After several years of drought, severe food deficiencies have become widespread in the belt of semi-arid steppe and brush-grass savannah that extends across Africa south of the Sahara Desert This belt is becoming narrowed on its northern side by desertification—the steady march of wind-blown sands—and its use for cattle-grazing is limited on the south by the tse-tse fly Pastoral nomads comprise a large segment of the human population of some 25 million; most of the remainder live on a meagre subsistence agriculture Parts of the area are traversed by large rivers, which are said to carry annually about 180 thousand million m^3 Three large ground-water reservoirs are believed to contain close to 6,000 thousand million m^3 The rate of recharge of the ground-water reservoirs is said to be only about 1.5 thousand million m^3 per annum [20] This undoubtedly could be greatly increased by draining down the water-table sufficiently to allow percolation into the reservoirs and to reduce evaporation losses from them. The quality of the ground water and its suitability for irrigation are not well known Alternative long-term courses of land and water development, which might prevent a recurrence of current disastrous conditions, are: range improvement, better range management; development of subsistence agricultural areas and resettlement of the population in these areas, and development of areas of intensive irrigation agriculture and resettlement of the population in those areas

56 In examining these alternatives, many technical factors must be considered, but social, political and economic constraints are undoubtedly more fundamental Rapid development would be essential if the conditions of life and the aspirations of the people are to be raised Otherwise, population growth would almost certainly keep up with increasing food supplies and the final outcome would be a more desperate situation than that which now exists. The countries of the region have very limited capital and technical resources In the early stages, these would have to be supplemented by the world community, particularly the rich countries and the commitment of these countries to the needed level of capital and technical assistance for the poor countries has been diminishing for a decade

CONCLUSIONS

57 The quantity of potentially arable land on earth is so much larger than the area actually cultivated today, and the possibilities for increasing agricultural production on currently cultivated lands are so great, that the area of the earth's surface that will be devoted to agriculture in the future is chiefly an economic and social variable, which differs from country to country, rather than a physical one [21]

58 Agricultural modernization in the less developed countries is essential if the growing populations of the world are to be fed Such modernization depends upon over-all social and economic development, as well as upon the development, application and dispersal of knowledge [22]

59 Social and economic development (increases in *per capita* incomes and a more equitable income distribution) is probably also a necessary condition for a significant and continuing reduction in rates of population growth and ultimately for a stationary world population

60 Man is faced with a paradox attainment of the earth's maximum carrying capacity for human beings would require a very large degree of agricultural modernization, and hence, social and economic development But such development would be likely to lead to a cessation of population growth long before the maximum carrying capacity was reached

61. The less developed countries confront a more immediate circularity In terms of both employment

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[19] Harvard Center for Population Studies, *Bangladesh Land, Water and Power Studies, Draft Final Report* (Cambridge Massachusetts, Harvard University Press, 1972), chaps II and V.

[20] Harvard Center for Population Studies, *Notes on Long-range Solutions for the Development and Management of the Steppe and Brush Grass Savannah Zone South of the Sahara* (Cambridge, Massachusetts Harvard University Press, 1973), pp 1-5

[21] T W Schultz, *Food for the World an Economist's View* Agri economics research paper No 72 (Chicago, Illinois University of Chicago, 1972)

[22] *Ibid*

9. From the beginning of agriculture until about 1950, expanding the cultivated area was the major means of increasing the world's food supply. Since 1950, however, raising output on the existing cultivated area has accounted for most of the increase. Intensification of cultivation has increased steadily since 1950; during the early 1970s, it has accounted for an estimated four fifths of the annual growth in world food output, far overshadowing expansion of the cultivated area.

10. The traditional approach to increasing production—expanding the area under cultivation—has only limited scope for the future. Indeed, some parts of the world face a net reduction in agricultural land because of the growth in competing uses, such as recreation, transportation and industrial and residential development. Few countries have well-defined land-use policies that protect agricultural land from other uses. In the United States, farmland has been used indiscriminately for other purposes with little thought devoted to the possible long-term consequences.

11. Some more densely populated countries, such as Japan and several Western European countries, have been experiencing a reduction in the land used for crop production for the past few decades. Other parts of the world, including particularly the Indian subcontinent, the Middle East, North Africa, the Caribbean, Central America and the Andean countries, are losing disturbingly large acreages of cropland each year because of severe soil erosion.

12. The availability of arable land is important, but perhaps even more important in the future will be the availability of water for agricultural purposes. In many regions of the world, fertile agricultural land is available if water can be found to make it produce. Yet most of the rivers that lend themselves to damming and to irrigation have already been developed. The expansion of world irrigated area is likely to fall into the familiar S-shaped curve as man runs out of easy opportunities to construct new irrigation reservoirs. Future efforts to expand fresh-water supplies for agricultural purposes will increasingly focus on such techniques as the diversion of rivers (as in the Soviet Union), the manipulation of rainfall patterns to increase the share of rain falling over moisture-deficient agricultural areas and, depending upon the cost of energy, the desalting of sea water.

13. The intensification of agricultural production on the existing cultivated area in many developing countries requires a several-fold increase in energy supplies. With world energy prices rising rapidly, the costs of intensifying food production will rise commensurately and the needed increases in energy use will become increasingly expensive. In countries already engaged in high energy agriculture, such as the United States, Japan and those in Western Europe, high energy prices and the possibility of fuel rationing may reduce future food production prospects below what they would otherwise be.

14. In addition to arable land, fresh water and energy, fertilizer is also now in short supply, and the outlook is for higher prices. It is impossible to separate the future availability of fertilizer from the scarcity of energy. In part this is because the manufacture of nitrogen fertilizer, the most widely used chemical fertilizer, commonly utilizes natural gas or naphtha as a raw material and in part because the manufacturing process consumes large amounts of energy. Fertilizer requirements over the remaining years of this century will soar to phenomenal levels.

15. One of the key questions concerning future gains in agricultural production is whether the more advanced countries can sustain the trend of rising per acre yields of cereals. In some countries, the rate of increase in per acre yields for some crops is beginning to slow down and the capital investments required for each additional increase may now begin to climb sharply. In agriculturally advanced countries, such as Japan and some countries in Europe, the cost of further raising yield per acre for some crops is rising. For example, raising rice yields in Japan from the current 5,000 pounds per acre to 6,000 pounds could be very costly. Raising yields of corn in the United States from 90 to 100 bushels per acre requires a much larger quantity of nitrogen than was needed to raise yields from 50 to 60 bushels. Higher fertilizer prices will, in this context, further reduce the potential for continuing yield increases.

Constraints on protein production

16. At a time when rising affluence is beginning to manifest itself in the form of rapidly growing demand for high-quality protein, a difficulty has suddenly arisen in the efforts to rapidly expand supplies of three major protein sources—beef, soya beans and fish. Two major constraints are operative in the case of beef. Agricultural scientists have not been able to devise any commercially satisfactory means of getting more than one calf per cow per year. For every animal that goes into the beef production process, one adult animal must be fed and otherwise maintained for a full year. There does not appear to be any prospect of an imminent breakthrough on this front.

17. The other constraint on beef production is good grassland. The grazing capacity of much of the world's pasture land is now almost fully utilized. This is true, for example, in much of the Great Plains area of the United States, in sub-Saharan Africa and in parts of Australia. There are opportunities for using improved grasses and for improved range management, but these are limited and slow to be realized.

18. A second potentially serious constraint on efforts to expand supplies of high-quality protein is the inability of scientists to achieve a breakthrough in per acre yields of soya beans. Soya beans are consumed directly as food by people throughout densely populated East Asia, and they are an important high-quality protein ingredient in livestock and poultry feeds throughout much of the world. The economic importance of soya

beans in the world food economy is indicated by the fact that they have become the leading export product of the United States of America, surpassing export sales of wheat, corn and such high-technology items as electronic computers and jet aircraft

19 In the United States, which now produces two thirds of the world's soya bean crop and supplies more than four fifths of all soya beans entering the world market, the yields per acre have increased by about 1 per cent per annum since 1950; corn yields, on the other hand, have increased by nearly 4 per cent per annum One reason why soya bean yields have not climbed very rapidly is that the soya bean, being a legume with a built-in nitrogen supply, is not very responsive to nitrogen fertilizer.

20 More soya beans are produced essentially by planting more land to soya beans. In the United States, close to 85 per cent of the dramatic fourfold increase in the soya bean crop since 1950 has come from expanding the area devoted to it. As long as there was ample idle cropland available, this did not pose a problem, but with this cropland reserve rapidly disappearing and with one in every six acres of cropland in the United States already planted to soya beans by 1973, serious supply problems could emerge.

21 The oceans are a third major source of protein From 1950 to 1970, the world fish catch expanded rapidly, going from 21 million to 70 million tons This phenomenal growth in the catch of nearly 5 per cent annually, which far exceeded the annual rate of world population growth, greatly increased the average supply of marine protein per person This is shown in table 1

TABLE 1 WORLD FISH CATCH TOTAL AND *per capita*

Year	Total catch (million metric tons)	Per capita (kilogrammes)
1950	21	8
1951	24	10
1952	25	10
1953	25	10
1954	28	10
1955	29	11
1956	30	11
1957	32	11
1958	33	12
1959	36	13
1960	40	14
1961	43	14
1962	46	15
1963	48	15
1964	52	16
1965	52	16
1966	57	17
1967	60	18
1968	63	18
1969	63	18
1970	70	19
1971	69	19
1972[a]	64	17
1973[a]	62	16

[a] Preliminary figure

22 In 1969, the long period of sustained growth in the world fish catch was interrupted by a slight decline of a few hundred thousand tons. In 1970, the catch resumed its upward trend, but the sharp rebound was short-lived Since then, it has declined for three consecutive years, falling some 8 million tons. With population continuing to grow, the *per capita* availability of fish declined 16 per cent during this three-year span, triggering dramatic price rises As stocks of some key commercial species are depleted, the amount of time and money expended to bring in the shrinking catch continue to rise every year Many marine biologists now feel that the global catch of table-grade fish is at or near the maximum sustainable level. A large number of the 30 or so leading species of commercial-grade fish currently may be over-fished, that is, stocks will not sustain even the current level of catch If the world fish catch stabilizes or declines, then that share of the growing global demand for protein until recently filled by growth in the fish catch, must now either be filled by land-based protein supplies or it must be choked off by further price rises The importance of evolving a co-operative international approach to the management of oceanic fisheries is underlined

23 Unfortunately, there is no prospect whatsoever that fish-farming could offset more than a small fraction of the decline in the oceanic fish catch for the foreseeable future Substantial expansion in the global fish supply from fish-farming await further advances in technology and extensive capital investment in fish-farming facilities

24 [illegible] expandi [illegible] that the [illegible] behind growth in demand for some time to come, resulting in significantly higher prices during the decade ahead than prevailed during the 1960s It may be that the world protein market will be transformed from a buyer's market to a seller's market, much as the world energy market has been transformed over the past few years.

ECOLOGICAL UNDERMINING OF THE WORLD FOOD ECONOMY

25 The increasing demand for food is putting more pressure on the food-producing ecosystem in many parts of the world than it can withstand One dramatic example is the anchovy fishery off the western coast of Latin America During the early 1970s, this vast fishery accounted for one fifth of the global fish catch During late 1972 and throughout much of 1973, the anchovies seemingly disappeared from the traditional off-shore fishing areas This did not cause a great deal of alarm since a slight shift in the Humboldt current and the change in temperature of a few degrees had caused the anchovies to move away at least temporarily before

26 There is now growing evidence that the very heavy off-take from the anchovy fishery ranging from

10 million to 12 million tons in the late 1960s and early 1970s may have exceeded the capacity of the fishery to regenerate itself. Over-fishing may have seriously damaged the anchovy fishery. If so, it may take years before it can recover to its full productive capacity, assuming it is given the opportunity to do so.

27. A second example of ecological over-stress, which is diminishing the earth's food-producing capacity, is now all too evident in the Sahel, just south of the Sahara in Africa. For many months in 1973, the news media reported the situation in sub-Saharan Africa as being the product of drought. The problem was described in terms of the need for a temporary food relief effort. The need was to get perhaps 600,000 tons of grain into half a dozen seriously affected countries over the next several months. This was indeed a problem. The need was real.

28. However, there is a much more basic problem in the Sahel. Over the past 35 years, human and livestock populations along the sub-Saharan fringe have increased rapidly, in some areas nearly doubling during this period. As the human and livestock populations multiply, they put more pressure on the ecosystem than it can withstand. The result is over-grazing, deforestation and over-all denudation of the land.

29. As a result of this denudation and deforestation, the Sahara desert has begun to move southward at an accelerated rate all along the 3,500 mile southern fringe, stretching from Senegal to northern Ethiopia. An "in-house" study undertaken by the United States Agency for International Development in August 1972 indicated the desert is moving southward at up to 30 miles per year, depending upon where it is measured.

30. As the desert moves southward, human and livestock populations retreat before it. The result is ever-greater pressure on the fringe area. This in turn contributes to the denudation and deforestation, setting in process a self-reinforcing cycle.

31. Coping with this situation requires far more than a temporary food relief effort. The world must recognize that a continuing food relief effort for this region will be required for the foreseeable future. But this treats only the symptoms of ecological over-stress. There is also now a need to attempt to arrest and reverse the southward movement of the desert. This will require an extensive infusion of technical expertise in desert reclamation and land management from outside the region. It will require economic resources from outside the region until some of the desert land can be reclaimed.

32. There is now a pressing need to address and alleviate the causes of ecological stress in the region which facilitates the southward movement of the Sahara. Failure to do so means the Sahara may engulf much of central Africa in a matter of years, destroying a significant slice of the continent's food-producing capacity. It will require, among other things, a concerted co-operative effort by the tier of countries most immediately affected, by the next tier of countries southwar[d] which is or will shortly be affected, and by a larg[e] number of external donors who must supply much o[f] the resources. Above all, it calls for the launching o[f] efforts to slow and stabilize population growth in th[e] region.

33. The need to arrest the southward movement o[f] the desert presents the international community wit[h] one of its most severe challenges. It will require a co-operative international effort comparable with tha[t] which was used to launch the "green revolution" in th[e] late 1960s. If this co-operative effort is not forthcoming one must accept the fact that a growing share of th[e] food-producing capability of Africa will be totally destroyed. This is occurring at a time when population in the African continent is still expanding in an unimpeded fashion.

34. Ecological over-stress is also very much in evidence in the Indian subcontinent. Over the past 15 years, as human and livestock populations have increased, the subcontinent has been progressively deforested. One does not need much training in soil and water management to be greatly alarmed at the long-term consequences of this progressive and accelerating deforestation. This is most serious in the Himalayas and the surrounding foot-hills, for this is where nearly all the major river systems of the Indian subcontinent—the Indus, the Ganges and the Bramaputra—originate.

35. One could have predicted several years ago with great confidence the long-term dangers inherent in deforestation, particularly of the Himalayas and the surrounding foot-hills. It should not have come as any surprise that during the late summer of 1973 reports came of the worst flood in the history of Pakistan, a flood so severe that it destroyed a large share of the spring wheat crop which was in storage on farms as well as a sizable share of the crops standing in the fields. Entire communities were washed away.

36. Since the deforestation is continuing, one can now say with considerable confidence that the incidence and severity of flooding in Pakistan, India and Bangladesh will be much greater in the future than it is at present. In effect, deforestation in the subcontinent, particularly in Nepal where the major rivers originate, may be undermining the food-producing capability of the subcontinent upon which nearly 750 million people now depend.

37. The pressures of continuously growing demand for food are beginning to undermine the food-producing ecosystems in many parts of the world. The examples given above are only a few of the many which could be cited. The time has come to inventory systematically these ecological stresses at the global level. Two generalizations can be made concerning agricultural stresses on the ecosystem. First, the situation is certain to worsen in the years immediately ahead; and, secondly, future world food production prospects will be affected.

38. Efforts to modernize agriculture in the less affluent countries in the 1950s and early 1960s were consistently frustrated When farmers in these countries attempted to use varieties of corn developed in Iowa, they often failed to produce any corn at all Japanese rice varieties were not suited either to local cultural practices or to consumer tastes in India. When fertilizer was applied intensively to local cereal varieties, the yield response was limited and occasionally even negative.

39. It was against this backdrop of frustration that the high-yielding dwarf wheats were developed by the Rockefeller Foundation team in Mexico. Three unique characteristics of these wheats endeared them to farmers in many countries—their fertilizer responsiveness, lack of photo-period sensitivity (sensitivity to day length) and early maturity.

40. When farmers applied more than 40 pounds of nitrogen fertilizer per acre to traditional varieties having tall, thin straw, the wheat often lodged or fell over, causing severe crop losses By contrast, yields of the short, stiff-strawed dwarf varieties of Mexican wheat would continue to rise with nitrogen applications of up to 120 pounds per acre Given the necessary fertilizer and water and the appropriate management, farmers could easily double the yields of indigenous varieties.

41. Beyond this, the reduced sensitivity of dwarf varieties to day length permitted them to be moved around the world over a wide range of latitudes, stretching from Mexico, which lies partially in the tropics, to Turkey in the temperate zone Because the biological clocks of the new wheats were much less sensitive than those of the traditional ones, planting dates were much more flexible

42. Another advantageous characteristic of the new wheats was their early maturity. They were ready for harvest within 120 days after planting; the traditional varieties took 150 days or more. This trait, combined with reduced sensitivity to day length, created broad new opportunities for multiple cropping wherever water supplies were sufficient

43. Within a few years after the spectacular breakthrough with wheat in Mexico, the Ford Foundation joined the Rockefeller Foundation to establish the International Rice Research Institute (IRRI) in the Philippines Its purpose was to attempt to breed a fertilizer-responsive, early maturing rice capable of wide adaptation—in effect, a counterpart of the high-yielding wheats. With the wheat experience to draw upon, agricultural scientists at IRRI struck "pay dirt" quickly. Within a few years they released the first of the high-yielding dwarf rices, a variety known as IR-8.

44. The great advantage of the new seeds was that they permitted developing countries to quickly utilize agricultural research that had taken decades to complete in Japan, the United States and elsewhere. In those areas of the developing countries where there were requisite supplies of water and fertilizer and price incentives were offered, the spread of the high-yielding varieties of wheat and rice was rapid. Farmers assumed to be bound by tradition were quick to adopt the new seeds when it was obviously profitable for them to do so.

45. Early in 1968, the term "green revolution" was coined to describe the introduction and rapid spread of the high-yielding wheats and rices In 1965, land planted with these new varieties in Asia totalled about 200 acres, largely trial and demonstration plots Thereafter the acreage spread swiftly as follows:

Year	*Acres*
1965	200
1966	41,000
1967	4,047,000
1968	16,660,000
1969	31,319,000
1970	43,914,000
1971	50,549,000

46 Acreage figures for Mexico are not included in the series given above since the new wheat had largely displaced traditional varieties before the green revolution became an international phenomenon in the mid-1960s. Among the principal Asian countries to benefit from using the new seeds are India, Pakistan, the Philippines and Turkey, and, more recently, Indonesia, Malaysia and Sri Lanka

47. During the late 1960s, the Philippines was able to achieve self-sufficiency in rice, ending half a century of dependence on imported rice Unfortunately, this situation was not sustained because of a number of factors, including civil unrest, the susceptibility of the new rices to disease and governmental failure in some cases to continue the essential support of the rice programme.

48. Pakistan has greatly increased its wheat production, emerging as a net exporter of grain in recent years In India, where advances in the new varieties were concentrated largely in wheat, progress has been encouraging. During the seven-year span from 1965 to 1972, India expanded its wheat production from 11 million tons to 27 million tons, an increase in a major crop unmatched by any other country in history.

49. One result of this dramatic advance in wheat production in India was the accumulation of unprecedented cereal reserves and the attainment of cereal self-sufficiency in 1972 This eliminated, at least temporarily, the need for imports into a country that only a few years before had been the principal recipient of food aid from the United States of America Economic self-sufficiency in cereals—when farmers produce as much as consumers can afford at prevailing prices—is not to be confused with nutritional self-sufficiency, however, which requires much higher levels of productivity and purchasing power.

50. During late 1971 and in 1972, India was able to use nearly 2 million tons from its own food reserves, at first to feed nearly 10 million Bengali refugees during the civil war in Pakistan, and later as food aid for

Bangladesh. A poor monsoon in 1972 temporarily forced India back into the world market as an importer of grain, but on a much smaller scale—4 million tons—than the massive import of nearly 10 million tons that followed the 1965 monsoon failure.

51. This is not to suggest that the green revolution has solved the world's food problems, on either a short- or a long-term basis. The drought of 1973 clearly demonstrated that Indian agriculture is still at the mercy of the vagaries of weather. A second monsoon failure or a shortage of fertilizer would seriously disrupt the pattern of progress that has characterized Indian agriculture over the past five years.

52. The green revolution can be properly assessed only when it is considered what things would have been like in its absence. The grim scenario that this question calls forth lends some of the needed perspective. Increases in cereal production made possible by the new seeds did arrest the deteriorating trend in *per capita* food production in the developing countries. The massive famine anticipated by many has been avoided. Although there have been some spectacular localized successes in raising cereal output, relatively little progress has been made in raising the *per capita* production of cereals among the less affluent countries as a whole over the past several years.

53. The green revolution does not represent a solution to the food problem; rather, it is a means of buying time, perhaps an additional 15 or 20 years during which the brakes can be applied to population growth. Close to a decade has now passed since the launching of the green revolution, but success stories in national family planning programmes in the less affluent countries are all too few. For example, reductions in birth rates are minimal in Bangladesh, India, Indonesia and Pakistan.

Depleted global reserves

54. The period since the Second World War has been characterized by excess capacity in world agriculture, much of it concentrated in the United States of America. In many ways the world was fortunate to have, in effect, two major food reserves during this period. One was in the form of grain reserves in the principal exporting countries and the other in the form of reserve cropland, virtually all of which was land idled under farm programmes in the United States.

55. Grain reserves, including substantial quantities of both food-grains and feed-grains, are most commonly measured in terms of carry-over stocks—the amount in storage at the time the new crop begins to come in. World carry-over stocks are concentrated in a few of the principal exporting countries—namely, Argentina, Australia, Canada and the United States.

56. Since 1960, world grain reserves have fluctuated from a high of 155 million metric tons to a low of about 100 million metric tons. When these reserves drop to 100 million tons, severe shortages and strong upward price pressures develop. Although 100 million tons appears to be an enormous quantity of grain, it represents a mere 8 per cent of annual world grain consumption, or less than one month's needs—an uncomfortably small working reserve and a perilously thin buffer against the vagaries of weather or plant diseases. As world consumption expands by some 2.5 per cent per annum, so should the size of working reserves; but over the past two decades reserves have dwindled while consumption has continued to climb.

57. The second major source of stability in the world food economy throughout much of the post-war period has been the reserve of idle cropland in the United States: roughly 50 million acres have been idle under farm programmes for the past dozen years or so. Though not as quickly available as the grain reserves, most of this acreage can be brought back into production within from 12 to 18 months once the decision is made to do so.

58. In recent years, the need to draw down grain reserves and to utilize the reserve of idle cropland has occurred with increasing frequency. This first happened during the food crisis years of 1966 and 1967, when world grain reserves were reduced to a dangerously low level and the United States brought back into production a small portion of the 50 million idle acres. It happened again in 1971, as a result of the corn blight in the United States. In 1973, in response to growing food scarcities, world grain reserves once more declined and the United States again resorted to cultivating its idle cropland, but to a much greater degree than on either of the two previous occasions. Government decisions in early 1973 permitted much of the idle cropland to be brought back into production. In 1974, there will be no Government payments to keep cropland idle.

59. Reserve stocks fell to close to 100 million tons in 1973 and are not expected to be rebuilt in 1974. World grain reserves have now fallen to their lowest level in two decades, though the world population has increased by half in the interim.

60. By combining global reserve stocks with the potential grain production of idle cropland, a good indication may be obtained of the actual total reserve capability in the world food economy in any given year. Taking this total as a percentage of total world grain consumption then provides a rough quantitative indicator of global food security for the year. As table 2 demonstrates, the world is now in a situation of extreme vulnerability. In 1973 and 1974, world reserve capabilities in relation to consumption needs have fallen far below any previous level in the post-war era.

61. From the end of the Second World War until quite recently, world prices for the principal temperate zone farm commodities, such as wheat, feed-grains and soya beans, have been remarkably stable. In part, this is because throughout much of this period world prices have rested on the commodity support level in the United States. Since world food reserves may become chronically low and the idle crop acreage in the United

TABLE 2 INDEX OF WORLD FOOD SECURITY

Year	Reserve stocks of grain	Grain equivalent of idle cropland in United States (million metric tons)	Total reserves	Reserves as share of annual grain consumption (percentage)	Reserves as days of consumption
1961	154	68	222	26	94
1962	131	81	212	24	88
1963	125	70	195	21	77
1964	128	70	198	21	77
1965	113	71	184	19	69
1966	99	79	178	18	66
1967	100	51	151	15	55
1968	116	61	177	17	62
1969	136	73	209	19	69
1970	146	71	217	19	69
1971	120	41	161	14	51
1972	131	78	209	18	66
1973	103	20	123	10	37
1974[a]	89	0	89	7	27

[a] Projection

States may decline sharply or even disappear entirely in the years ahead, there is the prospect of very volatile world prices for the important food commodities.

THE NORTH AMERICAN "BREADBASKET"

62 The extent of global vulnerability is particularly underlined by examining the degree of global dependence on North America for exportable food supplies Over the past generation, the United States has achieved a unique position as a supplier of food to the rest of the world Before the Second World War, both Latin America, especially Argentina, and North America (Canada and the United States) were major exporters of grain During the late 1930s, net grain exports from Latin America were substantially above those of North America Since then, however, the combination of the population explosion and the slowness of most Governments in Latin America to reform and modernize agriculture have eliminated the net export surplus With few exceptions, Latin American countries are now food importers.

63 As table 3 illustrates, over the past three decades North America, particularly the United States, which accounts for three fourths of the continent's grain exports, has emerged as the world's "breadbasket". Exports of Australia, the only other net exporter of importance, are only a fraction of those of North America The United States not only is the world's major exporter of wheat and feed-grains, it is now the world's leading exporter of rice North America today controls a larger share of the world's exportable surplus of grains than the Middle East does of oil

64. Exportable supplies of the crucial soya bean are even more concentrated than those of grains. The principal supplier is now the United States of America, which provided over 90 per cent of world soya bean exports in the 1960s and early 1970s With world demand for high-quality protein surging upward, Brazil—virtually the only other country capable of producing soya beans on a sizable scale in the foreseeable future—has rapidly boosted its soya bean production and exports. However, the United States is

TABLE 3 CHANGING PATTERN OF WORLD GRAIN TRADE

(Million metric tons)

Region	1934 1938	1948 1952	1960	1966	1973[a] (fiscal year)
North America	+ 5	+23	+39	+59	+88
Latin America	+ 9	+ 1	0	+ 5	− 4
Western Europe	−24	−22	−25	−27	−21
Eastern Europe and USSR	+ 5	—	0	− 4	−27
Africa	+ 1	0	− 2	− 7	− 4
Asia	+ 2	− 6	−17	−34	−39
Australia and New Zealand	+ 3	+ 3	+ 6	+ 8	+ 7

Note Plus sign (+) indicates net exports, minus sign (—) indicates net imports
[a] Preliminary figure

likely to continue supplying three fourths or more of the world's soya bean exports for many years to come.

65. At a time when dependence of the rest of the world upon North American food exports is increasing so dramatically, there is also a growing awareness that this extreme dependence leaves the world in a very dangerous position in the event of adverse crop years in North America. Both Canada and the United States are affected by the same climatic cycles.

66. Considerable evidence has now been accumulated indicating that North America has been subject to recurrent clusters of drought years roughly every 20 years. The cyclical drought phenomenon has now been established as far back as the 1860s when data were first collected on rainfall. The most recent drought, occurring in the early 1950s, was rather modest. The preceding one occurring in the early 1930s was particularly severe, giving rise to the dust bowl era in the United States.

67. If the United States experiences another stretch of drought years, quite possibly during the current decade, its impact on production will not likely be as great as during the 1930s due to improved soil management and water conservation practices. But even a modest decline in production, given the rapid growth in global demand and extreme world dependence on the North American exportable margin of food, would create a very dangerous situation. It would send shock waves throughout the world, triggering intense competition for available food supplies.

Redefining famine

68. High food prices and shortages are an inconvenience for the more affluent societies and individuals, but the less affluent countries, and the poor within countries, are in an especially dangerous predicament. When global reserve stocks are low, the capacity of the international community to respond to such emergencies as droughts or crop failures with food aid is greatly diminished. At the same time, high prices may keep needed food out of the reach of poor countries and individuals.

69. When one spends about 80 per cent of one's income on food, as does a sizable segment of mankind, a doubling in the price of wheat or rice cannot possibly be offset by increased expenditures. It can only drive a subsistence diet below the subsistence or survival level.

70. One reason it is possible for the world's affluent to ignore such tragedies is the changes that have occurred in the way that famine manifests itself. In earlier historical periods, famine was largely a geographical phenomenon. Whole countries or regions, whether Ireland or West Bengal, experienced dramatically high rates of starvation and death. Today, the advancements in national and global distribution and transportation systems have ensured that famine is generally more evenly spread among the world's poor rather than concentrated in specific locales. (The current tragedy in sub-Saharan Africa is an obvious exception.) The modern version of famine does not often permit dramatic photographs, such as those of the morning ritual of collecting bodies in Calcutta during the Bengal famine of 1943, but it is no less real in the human toll it exacts.

A global reserve system

71. The global food outlook calls for serious consideration of the creation of an internationally managed food reserve system. Just as the United States dollar can no longer serve as the foundation of the international monetary system, so agriculture in the United States may no longer have sufficient excess capacity to ensure reasonable stability in the world food economy over a multiyear period.

72. World food reserves can be built up in times of relative abundance out of production surplus to immediate needs, and drawn down in times of acute scarcity. This would help to hold down price increases to the consumer during times of scarcity and to hold up prices to the producers during the inevitable periods of production in excess of immediate world demand. In effect, the cushion and stability that surplus agricultural capacity in the United States has provided for a generation would be provided at least partially by a world food reserve system. A system of global food reserves would provide a measure of price stability in the world food economy that would be in the self-interest of all countries. The world community, of course, also has a basic humanitarian interest in ensuring that famine shall not occur in the densely populated low-income countries following a poor crop year—an assurance the affluent countries may be less able to provide in the future if the current system of autonomous, nationally oriented food planning is allowed to continue without modification.

73. In 1973, A. H. Boerma, Director-General of the Food and Agriculture Organization of the United Nations (FAO), proposed a new system of internationally co-ordinated national food reserve policies. Under the FAO plan, all countries—both exporters and importers—would hold agreed minimum levels of food stocks. Governments would consult regularly to review the food situation, evaluate the adequacy of existing stocks and recommend necessary actions. The FAO plan received preliminary international approval at the FAO conference in Rome in November 1973. [1] If it is to be implemented effectively, the countries of the world must provide strong political and economic support in the coming year.

74. In the past, the United States has provided the world with safe reserve levels largely as a side benefit

[1] *Report of the Conference of the Food and Agriculture Organization of the United Nations, Seventeenth Session*, paras. 116-132.

of its domestic farm income programme. In the seller's market for food-stuffs which emerged in 1973, these reserves—both large grain stocks and idle cropland—were reduced substantially. Under such conditions, it would be highly unrealistic to expect the United States to bear the considerable expense of building grain reserves large enough to ensure world security The FAO plan has the positive impact of spreading responsibility for reserve maintenance among both the exporting and importing countries of the world

75 Under the FAO or any other world food reserve plan, special measures will be necessary to assist less affluent countries in establishing storage facilities and building up needed reserves A new source of concessional assistance, perhaps in the form of an earmarked expansion of the soft-loan programme of the International Bank for Reconstruction and Development (World Bank), or a special fund within the FAO, will be necessary.

76 Prudence suggests that every effort be made to keep total world grain reserves of, at a minimum, 15 per cent of annual consumption Historically, strong upward price pressures have developed when reserves have fallen below that level. At the current time, this would imply a need for about 180 million metric tons of grain held in reserves

Modifying diets among the affluent

77. A variety of economic and moral forces may compel those in countries like the United States to reduce the demands they place on world food resources This can most readily be accomplished through the substitution of vegetable-based protein for animal protein. Such a shift has already occurred in the substitution of vegetable oils for animal fats; in 1940, the average American was consuming 17 pounds of butter and 2 pounds of margarine; but by 1971, consumption averaged 11 pounds of margarine and 5 pounds of butter Lard has almost been pushed off supermarket shelves by vegetable shortenings and a dominant share of whipped toppings and coffee whiteners marketed in the United States are now of non-dairy origin

78 Technology for the substitution of vegetable for animal proteins has made considerable progress, mainly in the area of soya-based meat substitutes. Food technologists can now compress soya fibres into meat form, and, with appropriate flavouring and colouring, come up with nutritious substitutes for beef, pork and poultry. Soya protein "extenders", augmenting meat proteins in ground meats, are already in wide institutional use in the United States, and began appearing in supermarkets for general use in 1973. There are now good economic, ecological and nutritional reasons for reducing the average consumption of animal products in the United States. This fact should be reflected in governmental research budgets and in nutritional education programmes

The agronomical potential of the less affluent countries

79. One of the most immediate means of expanding the food supply is to return the idle cropland in the United States to production, a process already in motion Over the longer run, however, the greatest opportunities lie in the developing countries, where the world's greatest reservoir of unexploited food potential is located

80. In those countries having the appropriate economic incentives, fertilizer, water and other required agricultural inputs and supporting institutions, the introduction of new wheat and rice varieties has increased production substantially However, the recent *jump in yields per acre in many developing countries* appears dramatic largely because their yields traditionally have been so low relative to the potential Current rice yields per acre in India and Nigeria still average only one third those of Japan; corn yields in Brazil and Thailand are less than one third those of the United States Large increases in food supply are possible in these countries at far less cost than in agriculturally advanced countries if farmers are given the necessary economic incentives and have access to the requisite inputs

81. When global food scarcity exists and the capacity of the international community to respond to food emergencies has diminished, a more convincing case than ever exists for strengthened international support of agricultural development in such populous food-short countries as Bangladesh, India, Indonesia and Nigeria An almost equally convincing case can be made that in doing so, particular attention should be placed on effectively involving small farmers in the production effort There is evidence that small-scale farmers, when they have effective access to agricultural inputs as well as health and education services, engage in labour-intensive agriculture and generally average considerably higher yields per acre than do large-scale farmers

82 Concentrating efforts on expanding food production in the less affluent countries could reduce upward pressure on world food prices, create additional employment in countries where continuously rising unemployment poses a serious threat to political stability, raise income, improve nutrition for the poorest portion of humanity and, by improving social conditions, help create a climate in which birth rates will fall more rapidly.

83 A very encouraging recent development with special benefit for the developing countries was the formation in 1971 of the Consultative Group on International Agricultural Research Headquartered at the World Bank in Washington, D C., the Group is actively supported by the World Bank, the United States Agency for International Development, the Ford and Rockefeller Foundations, and several other Governments, foundations and international organizations It is examining developing country research needs on a

5. These questions are not relevant exclusively to minerals. Such presumably renewable resources as fish and timber have been totally exhausted, while presumably non-renewable resources like minerals seem to be producible almost without end. In fact, analysts who have reviewed the issue carefully have not found many conceptual differences among natural resources on the basis of their renewability. [4] Nor have they been able to demonstrate any over-all tendency towards increasing scarcity (open space and timber are exceptions) in terms of higher real costs of production. [5] The way in which these general conclusions apply to minerals is examined below.

6. The literal notion of running out of mineral supplies is ridiculous. The entire planet is composed of minerals, and man can hardly mine himself out. Except for a few substances, notably crude oil and natural gas, which are discretely different from the rock masses that contain them, even the quantities of mineral materials in the upper mile of the earth's crust approach the infinite in size. A single cubic mile of average crystal rock contains 1 thousand million tons of aluminium, over 500 million tons of iron, 1 million tons of zinc and 600,000 tons of copper. Much the same sort of calculation can be made for sea water. This is not to suggest that such dilute materials will ever be mined, but only to indicate that exhaustion in a physical sense is meaningless.

7. Of more immediate interest is the fact that some of the elements that are most important to society are available in the greatest quantity. Copper and zinc are relatively rare metals. Iron and aluminium are not; together with a few other elements, they make up much of the crust of the earth; and there are thousands of square miles that could be considered low-grade iron and aluminium deposits, some of which will be mined in the future. Much the same can be said about phosphorus and potassium, the two critical mineral components for fertilizers. [6]

8. Further, there is a strong tendency for many mineral resources to increase in quantity as the quality that can be economically exploited goes down. In general terms, this means that there is much more copper available at 0.5 per cent than at 0.6 per cent, more iron at 35 per cent than at 40 per cent, and so on. Exponential grade-tonnage curves have been drawn for manganese, aluminium, titanium, nickel, lead, zinc and columbium, [7] which indicates that this tendency is by no means confined to a few commodities, as is sometimes asserted. [8]

9. In short, almost every bit of available evidence indicates that vast quantities do exist of mineral resources that could be mined; and, further, that either as their price goes up or as their cost goes down (which is to say, as technology of extraction improves), the volume of mineable material increases significantly—not by a factor of 5 or 10 but by a factor of 100 or 1,000.

10. The real question, then, is not whether resources exist, but at what rate different sources of supply will become *available to man* in the sense of being economically feasible to recover. Natural materials do not become resources until they are combined with man's ingenuity. Over time, the record is impressive. Mineral resources have become more and more widely available despite (and partially because of) growing rates of consumption. This, in crude form, is the modern economic view of mineral resources, or the "cornucopian" view, as it has been dubbed.

11. Unfortunately, most descriptions of mineral resources include only the material that could be mined at today's prices and today's technology—what is properly termed "reserves"—and thus quite understate their availability. [9] The difference between reserves and resources becomes critically important when dealing with the so-called "life index", the ratio of the reserves of some element to its current consumption. The resulting figure is best regarded as a sort of inventory of stock on the shelf, so to speak, but it is sometimes mistakenly taken to mean the years remaining until exhaustion. In fact, the ratio tends to remain stable over time. As shown in table 1, mineral reserves in Canada have grown roughly in proportion to mineral production except in cases (asbestos and natural gas in the table) where structural changes were taking place in the industry.

12. With respect to the situation for the world as a whole, some data supplied by Preston Cloud are instructive in this respect, for, contrary to his emphasis, the authors find them reassuring. [10] On the basis of

and the American Future (Washington, D.C., Government Printing Office, 1972), p. 79. The approach and general conclusions of this study, probably the best of its kind, are summarized by Joseph L. Fisher and Ronald G. Ridker, "Population growth, resource availability and environmental quality", *American Economic Review*, vol. 63 (May 1973), pp. 70-87.

[4] A. Scott, *Natural Resources: The Economics of Conservation* (Toronto, University of Toronto Press, 1955).

[5] Harold J. Barnett and Chandler Morse, *Scarcity and Growth: The Economics of Natural Resource Availability*, for Resources for the Future (Baltimore, Maryland, Johns Hopkins Press, 1963). See also the brief discussion by Chandler Morse, *American Economic Review*, vol. 63 (May 1973), pp. 126-128.

[6] The case of phosphorus has become something of a *cause célèbre* after the publication of a report which states that phosphorus resources will be exhausted before the twenty-first century: Institute of Ecology, *Man in the Living Environment*, Workshop on Global Ecological Problems (1971). However, including only the already identified resources is sufficient to refute the Institute of Ecology figure: G. Donald Emigh, "World phosphate reserves—are there really enough?", *Engineering and Mining Journal*, vol. 173 (April 1972), pp. 90-95.

[7] The most extensive discussion of the application of grade-tonnage relationships to mineral resources is by Philip Musgrove, who prepared an appendix entitled, "Mathematical aspects of the grade-tonnage distribution of metals, to mineral resources as a stock", in David B. Brooks, *loc. cit.*

[8] Preston Cloud, *loc. cit.*, pp. 80-82.

[9] The terms "resources" and "reserves" are properly defined for minerals by J. Zwartendyk, *What is "Mineral Endowment" and How Should We Measure It?*, Mineral Resources Branch, Mineral Bulletin 126 (Ottawa, Canada, 1972).

[10] Preston Cloud, "Resource use and population pressure—the deadly exponentials", paper prepared for Columbia University/United Nations Conference on Development and the Environment, April 1972 (photo-copy).

TABLE 1 CANADA MINERAL RESERVES AND MINERAL PRODUCTION, SELECTED COMMODITIES, 1955 AND 1969

Mineral	*Reserves* 1955	*Reserves* 1969	*Reserves* Ratio	*Production* 1955	*Production* 1969	*Production* Ratio
Petroleum (thousand millions of barrels)	2.75	10.5	3.8	0.13	0.41	3.2
Nickel (millions of tons)	6.00	8.5	1.4	0.17	0.26[a]	1.5
Copper (millions of tons)	14.50	22.9	1.6	0.33	0.61[a]	1.8
Iron ore (thousand millions of tons)	5.28	33.0	6.2	0.01	0.04[a]	4.0
Zinc (millions of tons)	20.4	34.2	1.7	0.43	1.16[a]	2.7
Natural gas (million millions of cubic feet)	16.6	53.4	3.2	0.15	1.98	13.2
Asbestos (millions of tons)	86.0	1,200.0	14.0	1.06	1.61	1.5

SOURCE Canada, Department of Energy, Mines and Resources, Mineral Resources Branch information

[a] Data for 1968 used for comparison because 1969 was a strike year

figure 1 (and other information), one foresees no problem to the end of the century in the economic availability of iron, manganese, silicon, aluminium, nickel and certain other materials, including energy minerals (taken together) These commodities include most of those upon which modern economic life is based

13. One must consider, however, the generations beyond the end of the century; the question is whether there will be enough for them as well Consider the record of the past 100 years, during which mineral supply has kept well ahead of long-term growth in mineral consumption. One may ask why a process of technological development that has been operating so well should come suddenly to an end New developments will, of course, have to come more rapidly with higher rates of consumption, but it can be argued that the steepest exponential curve of all is the growth of human knowledge

14. There are two main dimensions to the economics of future mineral availability.

(1) Geological extensions of supply through discoveries of new deposits and extensions of old ones,

(2) Technological extensions through the ability to work lower quality or less conventional materials

In the authors' judgement, future increases in mineral supply will come more from the latter than the former dimension, and this outcome depends almost entirely upon the growth of knowledge The distinction is important: a new discovery adds a new mine to the stock of resources; a new technology for lower quality resources can open up deposits across the world.

15. Therefore, it is simply not true, as is often remarked, that average rock will never be mined. As a matter of fact, in a few cases, commodities whose average grade in the ore deposit is lower than that in the crust are already being mined. (Titanium mined in beach sands is an example) By exploiting technology as capital rather than the ore deposit (i.e, land) as capital, the very commonness of the rock may be most attractive. The more common the rock, the more freedom one has to adjust the mine to the technology, rather than the other way around In short, through modest advances in technology, mineral deposits become more rather than less available, and they can be mined in more rather than fewer regions

16 Consider the case of nickel Persistent price increases and generally rising world-wide demand for nickel are finally allowing the development of lateritic nickel deposits. These deposits are much more widespread than the sulphide deposits, typical of existing producing regions, and they are easier to mine. Until recently, however, there had been no commercially feasible way to extract the nickel from them Judging from the success of several laterite mines in third world countries, this is no longer a problem As a result, world nickel reserves have been augmented by many times, and the nickel-mining industry will be less concentrated geographically and industrially

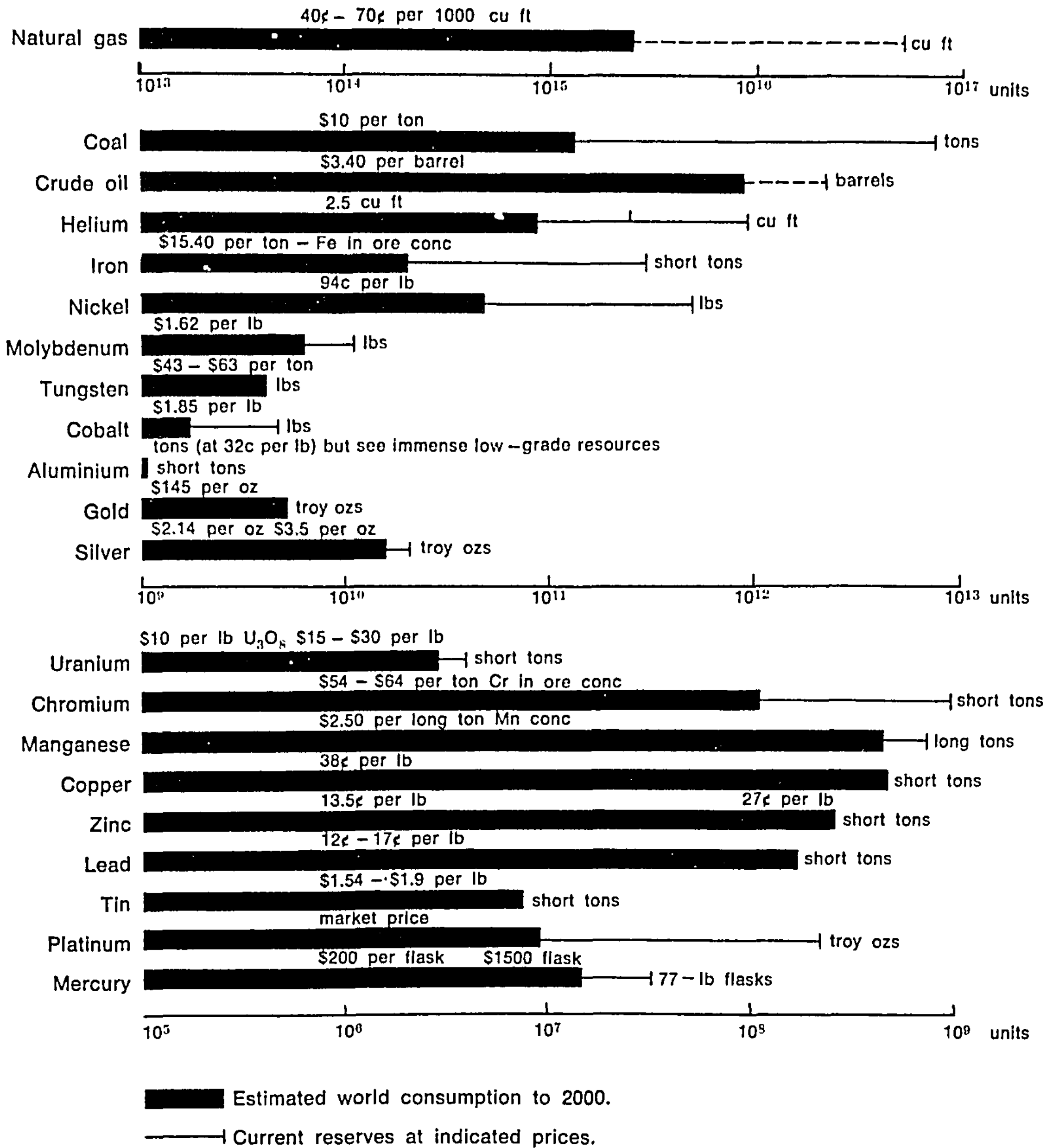
Mineral demand

17 Studies published in the past few years have, without exception, indicated an increasing demand for mineral commodities in the future, mainly from the countries that are already industrialized, but also from those countries in the process of industrializing

18. The most comprehensive recent set of mineral forecasts is that made by the United States Bureau of Mines.[11] World demand for primary, non-energy minerals was based on contingency forecasts and predicted a spread of growth rates from 3.8 to 5.6 per cent per annum. Demand in the United States of America was based on specific forecasts of growth of population and of gross national product (GNP) and predicted a spread of growth rates from 4.2 to 6.0 per cent per annum Some specific forecasts for the United States are given in table 2.

[11] United States of America, Department of the Interior Bureau of Mines, *Mineral Facts and Problems, 1970* (Washington, D C, Government Printing Office, 1970).

Figure I. Global mineral commodities



SOURCE: Preston Cloud, "Resource use and population pressure—the deadly exponentials", paper prepared for Columbia University/United Nations Conference on Development and the Environment, April 1972.

TABLE 2. UNITED STATES OF AMERICA: DEMAND FOR PRIMARY REFINED METAL, 1968 AND 2000

(Millions of metric tons)

	1968	2000 Low	2000 Medium	2000 High
Copper	1.40	4.40	5.80	7.20
Lead	0.80	1.20	1.90	2.50
Zinc	1.30	1.90	2.80	3.60
Manganese	1.00	1.70	1.90	2.10
Nickel	0.15	0.35	0.42	0.50
Aluminium	3.20	15.70	23.40	31.20

SOURCE: United States of America, Department of the Interior, Bureau of Mines, *Mineral Facts and Problems, 1970* (Washington, D.C., Government Printing Office, 1970).

19. Another major study of mineral demand to the year 2000 (for the United States only) was made by Resources for the Future, using an input-output model together with various assumptions of population growth and productivity change. [12] Some of these results, which tend to be lower than those of the Bureau of Mines, are shown in table 3.

20. Using a method that was apparently first developed by the International Iron and Steel Institute (IISI), [13] the Mineral Resources Branch in Canada has

[12] L. L. Fischman and H. H. Landsberg, *loc. cit.*

[13] International Iron and Steel Institute, Committee on Economic Studies, *Projection 85: World Steel Demand* (Brussels, March 1972).

TABLE 3 UNITED STATES OF AMERICA DEMAND FOR CERTAIN METALS IN 2000

(Millions of metric tons)

	Low population		High population	
	Low growth	High growth	Low growth	High growth
Copper	2 6	3 3	2 9	3 6
Lead	1.5	2 0	1 8	2 2
Zinc	2 8	3 5	3 2	4 0
Manganese	1 9	2 4	2 2	2 6
Nickel	0 29	0 36	0 33	0 40
Aluminium	11 9	14 5	13 0	15 9

initiated still another set of projections This method, referred to as "intensity-of-use analysis", predicts that demand levels may be lower in the year 2000, at least in industrialized countries, than do most other projections Similar results have been obtained in the study recently released on behalf of the United States National Commission on Materials Policy [14]

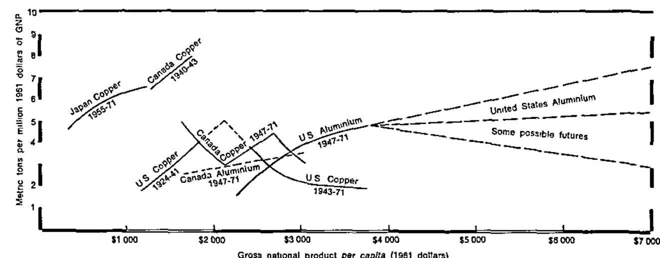
21 The intensity-of-use approach combines both time-series and cross-sectional information For each country, the quantity of some material used per unit of national product (its intensity of use) is plotted against *per capita* income. The IISI study showed that, as *per capita* income increases, the intensity of steel use at first rises but then peaks and begins to decline Absolute consumption of steel continues to increase because the decline in intensity is more than overcome by the increase in gross national product, but the increase in consumption is less than is forecast by trend analysis The level of income at which the intensity peak was reached varied by country, but it was close to $3,000 *per capita* for most Western industrial countries

22. When this method was applied to non-ferrous metals, similar peaked patterns were observed. Figure II shows some typical results for primary copper and aluminium Copper data for Canada and the U.S (plus Japan for purpose of illustration) were plotted for 1926-1971, long enough to show clearly the rise and decline in intensity (A shorter data base was used in the study prepared for the U S National Commission on Materials Policy; hence, the patterns are less clear) Intensity of use of copper in the United States fits the "ideal" shape, with the maximum occurring during the Second World War In Canada, there was no fixed pattern prior to 1940, but after the Second World War, a clear decline commenced, although with waves corresponding to the major post-war business cycles The position of the Canadian curve above that for the United States probably reflects the export orientation of the Canadian economy, since intensity of use is measured by shipments from refineries

23 The implications of declining intensity of use can be seen by further considering copper in the United States of America Figure II shows that the curve peaked at nearly 4 metric tons at between $1,700 and $1,800 *per capita* (1961 dollars) in the late 1920s and again in 1940 Ignoring the distortions of the Second World War, the curve declines fairly uniformly to slightly over 2 metric tons at $2,800 *per capita* from 1959 to 1961, and then fell more slowly in the following decade to just below 2 metric tons at $5,700 *per capita* If any decline continues, there are important implications for projections of consumption The projections of gross national product and population growth used by the Bureau of Mines indicate that an income *per capita* on the order of $7,000 (1961 dollars) can be

[14] Wilfred Malenbaum and others, *Material Requirements in the United States and Abroad in the Year 2000*, a research project prepared for the National Commission on Materials Policy (State College, Pa, University of Pennsylvania 1973)

Figure II Intensity of use of copper and aluminium: examples from Canada, Japan and United States of America



SOURCE Canada, Department of Energy, Mines and Resources, Mineral Resources Branch

expected in the United States by the year 2000. At that level, consumption of copper could be:

(*a*) At 2.0 metric tons per $1 million of gross national product (GNP), 4.9 million metric tons;

(*b*) At 1.5 metric tons per $1 million of GNP, 3.7 million metric tons;

(*c*) At 1.0 metric tons per $1 million of GNP, 2.7 million tons.

The Bureau of Mines median contingency forecast is 5.8 million metric tons.

24. The situation with respect to aluminium is more difficult. Its intensity-of-use curve is still rising in the United States, but the rate of increase has recently declined. The dashed lines in figure II represent three possible directions the intensity of use for aluminium might take in the United States. By the end of the twentieth century, they are equivalent to consumption levels of 7.3 million, 16.5 million and 22.2 million metric tons, which can be compared with the median forecast by the Bureau of Mines of 23.4 million metric tons.

25. These notes on future mineral demand only indicate that, as countries move into a post-industrial phase, their intensity of use of mineral commodities tends to decrease. The pattern for the currently less industrialized countries is not as clear, and other variables would have to be studied before sound comments could be made on total world demand. However, it does not appear likely that non-energy mineral consumption will continue to grow at the rates at which it has in the past.

The challenge to "cornucopianism"

26. The idea that mineral supplies could be greatly augmented by technology has always been challenged by certain geologists. Recently, their views have been seconded by some systems analysts. Several of the conceptual and empirical aspects specifically related to minerals can be dealt with fairly quickly here. [15]

27. The challenge based on geological evidence has several strains. First, some analyses depend upon extrapolation of production trends along mathematical curves. However, production history is not based solely on the geologically available supply, but also on such institutional factors as military policies and the tariff structure. Secondly, other analyses are based on either individual mines or types of ore deposits that are characterized by sharp cut-offs between ore and countr[y] rock. Unquestionably, mines and such ore deposits ca[n] be exhausted, but this does not prove that world supplie[s] are declining in an economically meaningful sense[.] Thirdly, still other analyses are based on questionabl[e] ideas about the economics of discovery. While explora[-]tion costs more now than formerly, this factor i[s] irrelevant. What is important is the cost per unit o[f] information gained, and eventually of ore discovered[,] and this cost is not increasing inordinately. [16] Moreover[,] it is hardly surprising that many deposits coming int[o] production today were discovered years ago, for today'[s] exploration is also turning up numerous deposits tha[t] will not be mined for some years.

28. Turning to the challenge deriving from system[s] analysis of the limits-to-growth type, the first commen[t] is that it mistakes both the nature of and the evidenc[e] concerning resource supply. Minerals are treated as i[f] they came from a fixed stock, an approach that is no[t] improved by qualifications that the reserve figures ar[e] perhaps off by a factor of five or ten. This merely compounds the confusion, for one is really dealing with a flow, not a stock, and with a flow that responds to demand. True, one may have witnessed a long-term increase in the price of copper over the past 10 years, though institutional factors have obviously played a role as well. And for some commodities, perhaps tungsten, real shortages may develop. [17] However, such exceptions are far from proving that prices for many minerals will increase exponentially in the future under consideration here.

29. Secondly, the effectiveness of a price-cost system in altering the quantities demanded and supplied is ignored. Surely one cannot reasonably assume that mineral prices will continue to rise but that this will have no stimulating effect on exploration, technological development and recycling (to say nothing of a damping effect on demand). Nevertheless, this assumption is made, leaving the authors open to the criticism that they did not deal with what, for all of its defects, is an effective and efficient adjustment mechanism (and one that can be applied whether the price derives from a market in a free entreprise system or from a central bureau in a centrally planned economy).

30. Lastly, the nature of demand is also mistaken. While dramatically increasing demands have been seen over the past several decades, this does not mean that such increases have been or will continue to be exponential. As shown above, more sophisticated analyses suggest that relative demands decline, after a point, with increase in *per capita* income. Indeed, even though absolute increases in quantities demanded are still enormous, relative growth is sufficiently damped for one study to suggest that mineral production will need to grow less rapidly in the future than it has grown in

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[15] D. H. Meadows and others, *op. cit.*, provides the best example of the challenge from the systems analysis point of view, while the chapters by T. S. Lovering, *loc. cit.*, and by P. Cloud, "Mineral resources, in fact and fancy", *loc. cit.*, provide the best examples of the challenge from a geological point of view. The geological challenge is criticized at length by David Brooks, *loc. cit.* The limits-to-growth thesis has stirred considerable debate. See, for example, the Consultative Assembly of the Council of Europe, *Report on The Limits to Growth*, including articles by Aurelio Peccei and Manfred Siebker (pro) and J. Maddox (con), document 3233 (22 January 1973). With respect to minerals in particular, William Page, "The non-renewable resources sub-system", *Futures*, February 1973, pp. 33-42.

[16] D. A. Cranstone and H. L. Martin, "Are ore discovery costs increasing?", *Canadian Mining Journal*, vol. 94 (April 1973), pp. 53-64.

[17] L. L. Fischman and H. H. Landsberg, *loc. cit.*, p. 93.

the recent past, exactly the opposite of most conclusions based on trend analysis [18]

31 The foregoing points combine to cast considerable doubt on the whole idea that mineral resources will limit growth For the model itself, this creates a very weak link in the causal chain [19] Thus, one must ask whether anything new has been learned from recent challenges to "cornucopianism"? The authors' conclusion is that nothing new has been learned, but that people have been reminded to ask some important questions

Some implications of high rates of mineral supply and demand

32 The first section of this paper concludes essentially that minerals can be made available (at prices not greatly different from current prices) to satisfy demands that are growing because of population growth, higher *per capita* incomes and changing technology Rather than focusing on physical or economic availability, this section assumes that these minerals are produced and questions some of the implications of producing them

Pollution

33. Perhaps the most widely recognized undesirable impact of higher rates of resource production and consumption is pollution In saying this, the authors are well aware that major improvements in pollution technology can be expected, so that mines and smelters will produce less effluent per ton of production, transport facilities will spill less per ton-mile etc However, to obtain a significant improvement in the environment, such steps are not sufficient. The decrease in effluents per unit of production or of consumption must more than overcome the increase in production or consumption itself Moreover, as scale of production increases, so does the impact of any miscalculation or accident (which is inevitable). Thus, one can either strive continually for technologies that will so reduce pollution as to permit safe production (and consumption) of whatever is wanted or one can reduce growth to make the technological task of environmental improvement less expensive and less frenzied.

34. There are two additional aspects of pollution that are less amenable to technological solutions. the chronic low-level exposure to pollutants that is all but inherent in an industrial world, and the possibility of triggering an ecological catastrophe.

35 Much pollution-control practice has been based on the theory that there are "thresholds" below which health effects do not occur It is now known that, for many pollutants, including radio-activity and lead, thresholds do not exist Chronic low-level exposure is important, for every addition of such pollutants, someone's life is shortened or days of sickness lengthened [20] Since some escape of such substances cannot be avoided, the greater the amount of them introduced into the environment, the less human life is implicitly valued

36 At the other end of the probability scale, it is conceivable that man could touch some physical or biological lever that will prove globally catastrophic Fortunately, such problems are less likely to derive from non-fuel minerals than from energy production and consumption Even the more difficult problems, acid mine drainage and smelter-based SO_x, tend to be local or regional in scope rather than national or international Nevertheless, however small the probabilities, they bear close surveillance as part of the Earthwatch programme which was initiated at the United Nations Conference on the Human Environment, held at Stockholm, 1972

Extensive land-use change

37 In speaking of pollution, reference has been made to effluents added to air, water or soil Somewhat different, but at least as much at issue in many mining regions, are the land-use changes that will be necessary if higher rates of production are to be achieved. For example, the surface-mining debate in most places is much more a question of appropriate land use than it is of pollution.

38 However, given that resources are irregularly distributed, the demands for efficiency and for large-scale production will dictate that resources be produced wherever they are found, and by low-cost methods Land for ecological preserves, recreation and agriculture is likely to take second place to demands for land to be used in mineral production For example, resources located in the Arctic or other untouched areas will have to be extracted, as will deposits of common materials (sand, gravel, rock) located near urban areas. Moreover, the production goal will be to economize on manpower and materials, and perhaps on energy, but at the expense of consuming, and sometimes irreparably altering, the land surface Such tendencies will be aggravated because, as grade becomes lower, more and more mining is required to recover the same volume of valuable metal or mineral. Thus, one has the proposals for using nuclear energy to fracture underground ore bodies or to remove the overburden from near-surface ones. [21] The very scale of such an effort, coupled with the need to isolate large areas from entry for reasons of safety, implies enormous land-use change.

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[18] W Malenbaum and others, *op cit*, pp 38-40

[19] This point is made forcefully by John S Carman, in his comments (unpublished, 1972) on the report of the Club of Rome entitled "Limits to Growth" See also, W Page, *loc cit*, p 41

[20] National Academy of Sciences, National Academy of Engineering, *Man, Materials and Environment*, a report for the National Commission on Materials Policy (Cambridge, Mass, Massachusetts Institute of Technology Press, 1973), pp 71-80

[21] David B Brooks and John V Krutilla, *Peaceful Use of Nuclear Explosives Some Economics Aspects*, for Resources for the Future (Baltimore, Md, Johns Hopkins Press, 1969)

NATURAL RESOURCE ADEQUACY AND ALTERNATIVE DEMOGRAPHIC PROSPECTS *

Ronald G. Ridker **

1. A long-term assessment of resource adequacy is important as a basis for establishing the proper sense of the urgency with which the population problem should be viewed, but it is a difficult topic because of the lack of knowledge about the material content of vast regions of the earth and about the nature and timing of future technological developments. To make a proper assessment one should be able to answer such questions as whether fusion reaction will be harnessed for large-scale production of electricity before the earth's supplies of fossil fuels become seriously depleted. But these questions are basically unanswerable and will probably remain so for the foreseeable future. All one can hope to do is provide a framework for thinking about these issues and a perspective that may be helpful in coming to some tentative, interim conclusions.

2. This paper attempts to do so by discussing the following four questions:

(1) The degree to which natural resources are important for economic development;

(2) Given the economic and population growth that has occurred during the past century, whether there is any indication that natural resources have become scarcer;

(3) Whether there are any indications that natural resources will become significantly scarce—that the world or major parts of it are likely to "run out" of important resources—in the future;

(4) Determination of the role that population growth, as opposed to other factors such as economic growth, plays in this process.

Of necessity, the answers provided are based on a number of very simplifying assumptions, but, it is hoped, assumptions that are useful in deriving implications for population policy. Environmental considerations, while important, were the subject of the Third Symposium on Population, Resources and the Environment, held at Stockholm from 26 September to 5 October 1973, and therefore will not be covered in detail.

ROLE OF NATURAL RESOURCES IN ECONOMIC DEVELOPMENT

3. No one would deny that enormous quantities of natural resources have been consumed in the course of the development of the developed countries, and that with only modest variations this pattern will repeat itself to the extent that economic development is achieved in developing countries. [1] While not sufficient, land and natural resources are certainly necessary conditions for development, just as are inputs of labour, capital and technical knowledge. But beyond these obvious points, there is considerable controversy. On the one side are those who argue that resources are of relatively little importance for development except in so far as they determine its direction. On the other side are those who emphasize the importance of climate, accessibility (a mixture of geographical location, topography and transportation technology), or one or another industrial resource, such as coal or iron.

4. Those who argue that resources are relatively unimportant to development begin by asserting that every country has the minimum necessary amounts of natural resources, and that what developing countries lack is the socio-technical knowledge and capital base necessary to take advantage of these resources. [2] This point of view is supported by showing that little, if any, correlation exists between incomes *per capita* and amounts of arable land or natural resources *per capita* in different countries. There are developing countries with rich resources and developed countries with poor resources; but there are no developed countries without a good socio-technical and capital base.

5. The explanation for this situation is the extent of the substitutability in both production and consumption that is possible among natural resources and between them and other inputs, including skills and organizational arrangements. Labour and capital can be substituted for land in the production of food to the extreme extent of using hothouse methods of production, animal power can be substituted for petroleum

* The original text of this paper (E/CONF.60/SYM.I/30) was submitted to the Symposium on Population and Development, Cairo, 4-14 June 1973; and to the Symposium on Population, Resources and Environment, Stockholm, 26 September-5 October 1973.

** Resources for the Future, Washington, D.C., United States of America.

[1] One likely variation is a lower materials content to the gross national product, since poor countries may be able to skip technological stages, going directly to materials-conserving methods. Another variation is in life-styles which might be less materials-using at the same income levels. But it is very unlikely that such differences would significantly alter the role played by resources in development.

[2] Simon Kuznets, *Towards a Theory of Economic Growth* (New York, W. W. Norton and Co., 1968), pp. 30-31.

in transportation systems and both forms of energy consumption can be reduced substantially through organizational arrangements and urban designs that minimize the need for private transportation. Moreover, fresh water can be collected from rain, rivers, lakes and underground sources or produced with energy and capital through desalination. A crude index of such variability in practice is provided by comparing the amounts of minerals used in producing a dollar of output in different countries. As can be seen in the following table, such use varies among groups of countries by as much as four times But the most important source of substitution possibilities arises from international trade, which permits a country like Japan, which possesses no iron ore, to become one of the most intensive users of this resource

SELECTED COUNTRIES AND RESOURCES, THOUSANDS OF METRIC TONS USED PER THOUSAND MILLION DOLLARS OF GROSS DOMESTIC PRODUCT, 1966-1969

	Iron ore	*Primary aluminium*	*Total energy (coal equivalent)*
United States of America	76	3 480	2,070
Western Europe	107	2 470	1,420
Japan	217	3 120	1,290
Latin America	53	0 850	1,190
Asia	33	0 830	980

SOURCE 'Materials requirements in the United States and abroad in the year 2000", a research project prepared for the National Commission on Materials Policy by The Wharton School, University of Pennsylvania, March 1973, under the direction of Wilfred Malenbaum

6 An important implication of this argument for population policy is that one cannot easily classify countries as overpopulated or underpopulated by comparing the amounts of arable land or natural resources *per capita* that they possess. Not only is there a serious problem of controlling for variations in productivity [illegible]

capacity to utilize existing resources and the capacity to substitute for scarce domestic resources, either through changes in the production and consumption functions, or through international trade

7 One cannot say, for example, that despite its potentially large resource base and low population densities, Brazil is underpopulated in relation to Japan It would be wrong to say this because of the greater capacity of Japan to extract, acquire and substitute for the land, minerals and fuels with which it is poorly endowed on a *per capita* basis To say that Brazil is underpopulated in relation to Japan, one must argue that the population densities of Brazil with respect to land and natural resources will remain favourable when it has acquired the same socio-technical capacity that Japan currently has But the development of such capacity takes time, if current rates of population growth and resource exploitation continue in Brazil, the outcome is not at all clear

8 It may be asked if natural resources are that unimportant Surely, countries with more natural resources are better off than those with less, indeed, in large measure just because a rich resource base can be used to build or buy the technology and capital necessary to take further advantage of that base. Substitution possibilities can be exaggerated, especially for countries that lack the income, knowledge and capital necessary to make the substitutions; and even developed countries may not be able to develop alternatives quickly enough, if a number of shortages occur at once in a brief period of time.

9 Furthermore, while international trade permits some countries to compensate for the natural resources they lack, it cannot similarly compensate for a world-wide shortage To put it differently, it must be asked how many countries could simultaneously follow the route taken by Japan and the Netherlands, of trading their technological and organizational abilities for resources, before the basis for this trade would be destroyed, that is, whether the high level of living of such countries is dependent upon the existence of less industrialized developed countries with little else than natural resources to trade

10. It is, therefore, to be concluded that the argument that resources are unimportant applies only to developed countries, and then only in a world of relative abundance or when sufficient time is available to develop alternatives In the other four fifths of the world, which currently lacks the capital, drive, skills and institutions necessary to compensate for the niggardliness of nature, the presence or absence of adequate supplies of natural resources on a *per capita* basis can mean the difference between development and no development

NATURAL RESOURCE ADEQUACY IN HISTORICAL PERSPECTIVE

11. If the world's resource base is being depleted, resource prices, in relation to those of labour, capital and finished goods, should be increasing; but there is little, if any, historical evidence to suggest that this is the case. Indeed, one of the most comprehensive studies [3] of this issue undertaken to date—one that looks at statistical evidence from the United States of America for the period 1870-1957—suggests the opposite. not only have relative prices of natural resources fallen, but the cost of extractive output in relation to that of total output has decreased during this period. The explanation for this phenomenon is to be found in a variety of factors, including shifts in demand from less plentiful to more plentiful resources,

[3] Harold J. Barnett and Chandler Morse, *Scarcity and Growth The Economics of Natural Resource Availability* for Resources for the Future (Baltimore, Maryland Johns Hopkins Press, 1963)

technological advance in conversion and extraction, and new discoveries within the United States of America. Increases in imports as a means of keeping prices down were not very important, according to the authors of this study. A more recent study,[4] which follows the same statistical series up to 1969, indicates that, in general, these prices and costs have continued downwards, but, depending upon how much weight one gives to recent years, may be bottoming out. Long-term studies of the terms of trade between raw materials and manufactured goods in international trade tends to support these findings. Unfortunately, however, similar studies for other countries do not appear to be available.

12. This finding for the United States of America is not very surprising. All it says is that new discoveries and technological developments permitted supplies of raw materials to grow at least as rapidly as demand during this historical period. It says little about the world as a whole and nothing at all about the distribution among countries of resources and incomes, which became more unequal during the period under review. Most important, the finding says nothing about the future, but it should at least give one pause before assuming without further study that the world is obviously heading into an era of growing resource scarcity.

RESOURCE ADEQUACY IN THE FUTURE

13. Whether resources will be adequate in the future or not depends in large measure upon the time horizon. If population and material economic growth were to continue without abatement, and if one rules out the possibility of importing materials and energy from outside the earth (or exporting people) on an ever-increasing scale, it is certain that the earth would eventually run out of resources, environmental carrying capacity or space. The second law of thermodynamics, the entropy law, makes this quite certain. Indeed, this same law makes it certain that even a constant rate of economic activity cannot be maintained forever, unless that level of activity is sufficiently low to permit mankind to live within the limits imposed by the flow of solar energy he is able to tap.[5] Technological breakthroughs may make it appear to be possible to continue growth forever. But this illusion arises from man's myopia. Scientific knowledge can only postpone the consequences of the laws of nature, it cannot repeal them. No matter how closely one may approach it, there is no such thing as a perpetual-motion machine.[6]

14. But knowledge that growth must eventually cease is of no practical significance as such. One may ask how much time mankind has. If mankind has from hundreds to thousands of years, as the technological optimists believe, there is room for non-resource considerations to play an important role in determining how forcefully measures to limit growth are applied. In this case, it is easy to imagine policy-makers deciding to continue to encourage economic growth, while limiting family planning activities to helping parents reduce the gap between desired and actual family size. On the other hand, if the people on this earth, or at least on parts of it, have no more than from 50 to 150 years before exhaustion of resources is approached, as those who argue against reliance on technological "fixes" and new discoveries maintain, far more stringent policies are called for.

15. Two studies, taken together, can be used to shed at least some light on this question. One is the comprehensive review of projected world-wide demands and estimates of reserves for individual natural resources undertaken by the United States of America, Bureau of Mines, in 1970,[7] and the other is a study of the United States undertaken by Resources for the Future (RFF).[8] Concentrating on the next half a century, these projections can be characterized as free from surprises and conservative in the sense that they assume no significant changes in tastes, technology, institutions or relative prices, and fairly rapid increases in population and economic growth. Demand for the rest of the world is based, more or less, on an extrapolation of trends in consumption during the past two decades, while that for the United States is derived from a dynamic input-output model of that economy. Reserve estimates incorporate the judgement of experts about the world's "known and potential reserves", a term that includes "concealed deposits for which there is specific geologic evidence and for which the specific

[4] Study being undertaken by Professor Robert Manthy, Michigan State University, East Lansing.

[5] The qualification is important, for the amount of solar energy received by the earth is enormous in relation to terrestrial stocks of energy. Hard to believe though it may be, the entire terrestrial stock of energy is estimated to be equal to only four days of sunlight. In principle, this could permit man to live for another 5 thousand million years (the remaining estimated active life of the sun) at a reasonably high level of living, provided population growth ceased during the next century. But as a practical matter, with technologies and ways of life one can imagine evolving and spreading throughout the world in the foreseeable future, this indefinitely sustainable level of living is probably significantly below the level at which most of humanity exists today. A fascinating discussion of these issues can be found in N. Georgescu-Roegen, *The Entropy Law and the Economic Process* (Cambridge, Mass., Harvard University Press, 1971).

[6] Another often-mentioned reason why growth must eventually stop is environmental deterioration. But in the final analysis it is a question of the availability of energy in useful forms, for with it, man can treat, move or protect himself from pollution and environmental deterioration. Even space can be increased with sufficient energy, by building upwards and outward. A limitation on the use of energy could be the buildup of waste heat. But this depends upon the source of energy and the efficiency with which it is utilized. To the extent that reliance is placed on geothermal heat and energy from the sun, a serious buildup of heat need not occur.

[7] United States of America, Department of the Interior, Bureau of Mines, *Minerals Facts and Problems, 1970* (Washington, D.C., Government Printing Office, 1970).

[8] Ronald G. Ridker, ed., *Population, Resources and the Environment*, vol. III of Commission research reports of the Commission on Population Growth and the American Future (Washington, D.C., Government Printing Office, 1972).

location can be described", but which "makes no allowance for ore in unknown structures or undiscovered districts", or for "paramarginal and submarginal reserves" which would require sizable increases in prices to be considered commercially valuable.[9]

16. Of the 19 non-fuel minerals reviewed in the RFF study, world-wide reserves as now estimated appear inadequate to meet the "high" projections of cumulative demand between now and the year 2000 in the cases of aluminium, lead, zinc, tungsten and sulphur. By 2020, copper, manganese, nickel, molybdenum and titanium would be added to this list For example, world-wide consumption of copper, estimated at 7 4 million tons in 1968, is projected to be from 20 million to 39 million tons in 2000 and from 37 million to 116 million tons in 2020 (the differences between the high and low numbers indicate how poor these estimates are), or in cumulative terms, from 792 million to 1,180 million tons for 1968-2000 and from 2,277 million to 4,974 million tons for 1968-2020. By contrast, the world's principal commercial resources of copper, in metal content, is estimated at 808 million tons

17 But the significance of these findings differs considerably among minerals Only modest price increases would be necessary to turn a deficit of sulphur and aluminium into a surplus. In other cases, somewhat greater increases in prices, sufficient to increase exploration and stimulate some substitution and additional recycling, would be necessary to close the gap between demand and supply. The most serious case is tungsten, for which it is difficult to establish a reserve picture that promises adequacy, here, main reliance might have to be placed on technological changes that permit the gradual phasing-out of this metal in applications that can use, though perhaps at higher cost, substitute materials and processes.

18. World energy demand and supply projections depend so heavily upon the technological changes that projections in this case have been limited to the year 2000. For that period, fossil-fuel reserves appear quite adequate to meet the expected fourfold increase in demand, even without including oil in shale and tar sands Nuclear fuels also should be adequate, particularly if breeder technology is fully developed. But the situation is not quite so favourable when environmental problems are included, problems that pervade all stages of energy use, from extraction through conversion and use So far, for example, no one has a completely satisfactory solution to the problem of storing radioactive wastes from fast-breeder reactors. Such problems could result in a significantly slower increase in supply than is needed to meet demand without substantial price increases. On the other hand, if the world learns how to tap fusion, solar energy or geothermal sources on a significant scale, there may be no need to worry about global shortages of energy for some centuries to come.

19. Land and water for agriculture are studied in the RFF report, but only for the United States of America, for which supplies of those two resources appear to be relatively abundant in the aggregate, although different parts of the country are likely to experience overcrowding and water shortages which can be overcome only through costly capital projects and migration The situation is probably the same for the world as a whole: over-all adequacy but severe shortages in individual countries—shortages that can be overcome only through increasing amounts of capital and greater reliance on international trade

20 While these estimates are conservative in the ways indicated above—in particular because significant technological breakthroughs, discoveries and substitution possibilities were ignored in making the projections—they are over-optimistic in the sense that they ignore the enormous quantities of capital required to exploit these reserves and the growing world-wide imbalances that make such exploitation increasingly risky and difficult in both economic and political terms Between 1925 and 1967, energy imports into Western Europe, as a fraction of its total consumption, increased from 2 to 61 per cent, and that for Japan, from zero to 80 per cent Eastern Europe, which exported over 15 per cent of its energy production, currently imports 5 per cent, while the United States shifted from being a 3 per cent net exporter to becoming a 7 per cent net importer. These trends can be expected to continue for at least another decade, increasing the dependency ratio of Western Europe to about 75 per cent, and that for Japan and the United States, to over 90 per cent and 30 per cent, respectively[10] Corresponding to these figures are dramatically increased exports from a small number of countries, principally in the Caribbean, the Middle East and North Africa. Trends for many other minerals are similar

21 In response, one can expect major producing countries to attempt to shift terms of trade in their favour, as is already happening in the case of oil, while major consuming countries take increasingly aggressive steps to ensure steady, secure supplies of oversea resources In this situation, one cannot blithely assume that supplies of new resources will be developed and traded as, when and where needed to keep up with the growth in demand, despite physical adequacy on a global level The situation for developing countries that do not have such resources to export could become very serious They may be caught between the growing ability of producing countries to obtain better terms and the ability to pay possessed by developed coun-

[9] V E. McKelvey, "Mineral resource estimates and public policy", Seventh McKinstry Memorial Lecture, Harvard University, 23 February 1971

[10] Beyond this point, such ratios are difficult to predict because of the efforts that will be initiated to counteract this dependence One can, for example, expect developed countries to speed up efforts to develop off-shore petroleum sources and nuclear electric production, as well as shale and tar-sands in North America, but difficult environmental problems will have to be faced

tries, without being able to raise the capital necessary to check their growing dependence upon foreign sources. Clearly, their only long-run solution is to restrict growth in demand, which, in most such countries, must mean population control if levels of living are not to suffer.

22. Thus, while one can say, in general, that physical quantities of natural resources are sufficient to meet demands arising from expected population and economic growth throughout the world during the next 50 years, the development and trading of these resources may not go smoothly, leaving uncomfortably small margins for error, mismanagement, inadequate technological response, trade disruptions and increased consumption resulting from military conflicts. Beyond this 50-year time horizon, the author refuses to speculate. It is clear that such risks and problems will grow as long as natural resource demands grow and that they will recede, at least temporarily, as technological advances and new discoveries relieve the pressure. It is also clear that poor, resource-importing countries will fare worse under adverse conditions than will developed countries and exporting countries; but there is no way of knowing how these diverse trends will develop in different countries or how long this situation can continue. [11]

ROLE OF POPULATION AND LEVELS OF LIVING

23. One may question the degree of importance of population growth, as opposed to other factors, such as increased levels of living, in generating these growing demands for natural resources. Once again, the answer depends upon the time horizon involved. If one is concerned with the next five years, monetary and fiscal policy can surely do more to eliminate a shortage of a particular resource than a change in population policy. But the longer the time period, the more important a change in the population growth rate becomes. The answer also depends upon the approach taken, for example, upon what is being held constant in the analysis and upon how the comparison is made. Moreover, the answer will be different for different countries and for different resources.

24. The RFF study referred to above attempted to answer these questions for the United States of America by comparing resource requirements in the year 2000 under alternative assumptions about growth in population and *per capita* gross national product, using a computer simulation-model that permitted the time-path of all other factors that affect the situation to be held constant between runs. The results indicate that if, by the year 2000, population was to be 1 per cent less than expected, the consumption of resources in that year would be between 0.2 and 0.7 per cent less, depending upon the particular resource considered. A reduction of 1 percentage point in *per capita* GNP in the year 2000 would reduce consumption of resources by from 0.6 to 3.5 per cent. On average, the elasticities for population are about two thirds of those for GNP *per capita*.

25. Before interpreting these results, two additional points should be kept in mind. First, in deriving these results, the change in *per capita* GNP that occurs because of the change in population was permitted to influence the elasticity calculation. A decline in *per capita* GNP can occur independently of a change in population size; but it is difficult to imagine a change in population size that is not accompanied by some change in *per capita* GNP, so long as one assumes no change in the rate of employment and the level of labour productivity. Since a decrease in population tends to be associated with an increase in *per capita* GNP, the effect of the decreased numbers is partially offset by the greater income. As an experiment, the author tried a special run of the model which factored out the population-induced change in *per capita* GNP and found that the elasticities for population in this special case are about the same as those for GNP *per capita*.

26. Secondly, these modelling results do not take into account all the relationships between population, resources and GNP *per capita*. In particular, they cannot reflect the additional risks faced by a country with a lower GNP *per capita*. While a reduction in the growth of *per capita* GNP reduces consumption of resources it also reduces the development of the socio-technical capacity to cope with future resource problems; a reduction in population growth has no such offsetting disadvantages, so far as the economy is concerned. [12]

27. For these reasons, as well as for others detailed in that report, the RFF study concluded that a cessation in population growth in the United States of America was more important as a means of alleviating resource and environmental problems than these numbers indicate. To quote from that study:

"If because of personal preferences, we choose to have more rather than less children per family . . . we

[11] See Donella H. Meadows and others, *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind* (New York, Universe Books, 1972). This study, which has recently received considerable publicity, claims that global resource demands cannot continue growing at current rates for more than another 100 years without dramatic increases in world-wide death rates ensuing. While this conclusion follows from the authors' assumptions, there is no adequate justification for making these, rather than some other set of assumptions, for this time period. See the annex to this paper for a brief criticism of this book.

[12] The only possible disadvantage is loss of economies of scale; but for the United States of America and perhaps for all but the smallest countries which enjoy low population-resource densities, this qualification is probably not important. Of greater importance in taking advantages of such economies, if they exist, will be the magnitude of effective demand, which, in addition to sheer numbers, depends upon income levels, internationally as well as domestically, the degree to which tastes are homogeneous, the extent to which income distribution is more equal (and hence tastes more homogeneous), and the degree to which firms are able to take advantage of specialization through horizontal integration, vertical disintegration and international trade.

commit ourselves to a particular package of problems more rapid depletion of domestic and international resources, greater pressures on the environment .. and perhaps the continued postponement of the resolution of other social problems, including those resulting from past growth. So long as population growth continues, these problems will grow, slowly but irreversibly forcing changes in our current way of life.

"If we choose to have fewer children per family... we purchase time, resources, and additional options· time to overcome our ignorance and to redress the mistakes of past growth, resources to implement solutions, and additional freedom of choice in deciding how we want to live in the future

"Similar consequences could emerge from the choice open to us with respect to alternative rates of economic growth ... But growth in the economy can be utilized for different ends than it is put to now While it adds to problems that need solution, it also adds to capacity to solve problems It is difficult to find similar offsetting advantages from additional population growth at this stage in United States history".[13]

28. If similar studies were available for other countries, they would undoubtedly suggest a larger role for variations in population growth, especially in developing countries. First, all the elasticities for both population and GNP *per capita* are probably larger. Except for land for agricultural purposes, the material intensity of GNP tends to be low for very poor developing countries but rises very quickly as GNP *per capita* increases, national intensity then begins to fall off again as high levels of income are achieved The United States and other older developed countries are in a declining phase, while most other countries are still rising

29. Secondly with lower incomes *per capita*, and often with higher population resource densities, the elasticities associated with population are likely to be greater relative to those for GNP *per capita*

30 Of primary importance, however, as was suggested in the previous section is the fact that developing countries are far more vulnerable than developed countries to resource shortages. Their only long-run hope to reduce this vulnerability, a vulnerability that is likely to grow with time, is a reduction in population growth so that a larger fraction of output can be devoted to improving the capital stock and the quality of human inputs into the production process

[13] R G Ridker, *op cit*, p 19

IMPLICATIONS FOR POLICY

31. The implications for population policy should be fairly clear. So far as resources are concerned, there seems to be nothing to gain and much to lose from continued population growth The importance of this conclusion varies by country, being greatest in developing countries lacking a good natural-resource base and in countries with high rates of population growth Almost all countries, however, stand to gain something from a reduction in population growth rates

32 The implications for policies pertaining to economic growth are less clear No one would suggest that developing countries should limit growth in their *per capita* incomes as a means of conserving resources. Indeed, perhaps the most important benefit from a reduction in population growth is that the savings it permits may be used to induce a more rapid growth in *per capita* incomes But the question must be asked whether there is any justification for already developed countries further increasing their consumption of the world's scarce resources

33 If one could be reasonably confident that developing countries would benefit from a decrease in consumption of natural resources on the part of developed countries, and if the rate of technological advance were not adversely affected in the process, it is difficult, considering the problems of the world as a whole, to find any justification for developed countries increasing their consumption of the world's scarce resources. However, a reduction in the consumption of resources by developed countries would not automatically help developing countries. This reduction would be of help only if the sale of these raw materials by developing countries were not an important fraction of their export earnings (but for many it is) and if some means could be found to transfer to them in usable form the resources that the developed countries release by consuming less. Permitting these resources to remain idle does not help the developing countries Nor will permitting such resources to remain idle help future generations, if in the process a poorer socio-technical and capital base is passed on to them. The grandchildren of this generation of mankind will not be grateful for the conservation of fossil fuels if, as a consequence, the mysteries of fusion are not solved.

34 What is called for, therefore, is not so much a reduction in economic growth-rates by the developed countries as a reordering of priorities, priorities that stress increased assistance to developing countries and increased emphasis on the kinds of scientific and technological development that will result in the creation of new resources for the future.

[*Annex follows overleaf*]

ANNEX

A Note on *The Limits to Growth* [a]

The Limits to Growth purports to demonstrate that the only way to avoid cataclysmic increases in world-wide death rates within the next 100 years is to stop all population and material economic growth throughout the world during the next two decades or so. But this demonstration is not convincing on at least three counts.

First, the model used contains few of the important adjustment mechanisms that have helped the world avoid similar catastrophes to date. There is no price mechanism to signal pending shortages, to make it profitable to invest more in exploration and research or to induce consumers to reduce their consumption and shift to substitutes. There is no Government to monitor the situation and to supplement the price mechanism where it does not provide adequate signals. Nor does anyone learn from the experience of others and change his behaviour accordingly. In its review of the book, the Task Force of the International Bank for Reconstruction and Development (World Bank) states:

> "Can we really believe that most of the population of Detroit could succumb to persistent pollutants without the rest of humanity making any adjustments in its producer-consumer behavior? Humanity faces these problems one by one, every year in every era, and keeps making its quiet adjustments. It does not keep accumulating them indefinitely till they make catastrophe inevitable. One does not have to believe in the invisible hand to subscribe to such a view of society. One has merely to believe in human sanity and its instinct for self-preservation."

Closely related are the problems arising because of the extreme degree of aggregation incorporated in the model. There is only one composite industrial output, one non-renewable resource, one "pollutant" and one geographical unit, the world as a whole. Not only does such a formulation greatly reduce the confidence one can have in the postulated relationships between the aggregates, it greatly compounds the problems arising from inadequate adjustment mechanisms. Consumers cannot substitute between outputs, producers cannot substitute between resources, society cannot alter the composition of output, e.g., deciding to spend less on military equipment and more on research, development and exploration. Since the model does not allow for these possibilities, there is really no alternative to reductions in population and economic growth.

Thirdly, the study incorporates highly pessimistic assumptions about technological progress, future reserves of non-renewable resources, the ability to control and absorb pollution and the extent of population growth that is likely in the next two centuries. In addition to leaving out the possibilities of such technological breakthroughs as fusion ar —the omission of which may make sense in horizon, but not when projecting beyond th shale oil, tar sands and geothermal sources c ignored. The authors allow for the possibility their aggregate resource could increase five next 100 years, a seemingly generous allowa recalled that, according to the U.S. Bureau of estimates of iron ore increased about five times and 1965 and that for copper by 3.5 times sin over, promising underwater sources of mineral in reviewing this possibility, IBRD finds that 20 years it should be possible to recover on basis 100 million tons of nodular materials fro each year, and that such recovery could be sustained "indefinitely" at a level of 400 mil smaller of these figures "would add to the ann of copper, nickel, manganese and cobalt to roughly one fourth, 2 times, 6 times, and 12 tim compared to the current free-world productio need not concur in detail with this judgemer assert that this possibility should not be ignore

As concerns pollution, there is no scientific the functional relationships assumed in the m amount of pollution that can be safely absorbed environments; for the effect of pollution on bi rates; or for the degree to which treatment a process can reduce pollutant emissions per unit c with respect to population growth, the historica between birth and death rates and the level o cannot blithely be projected into the long-term health and family planning programmes, the modern contraceptives and spread of knowledg and changing attitudes towards marriage and operating to weaken the historic linkages. Indeed, materials (not available at the time *The Limits t* written) suggest that a slow-down in populatior have already begun in 56 out of 66 countries f are available.

Contrary to what the book says, all these make a significant difference in one's estimate how growth must stop. First, a correction of the mistic assumptions could result in a postponeme centuries of the date at which growth must introducing additional adjustment mechanisms. that limit is approached, all kinds of adjustment will come into play to slow and elongate the de the idea of talking about a specific "date" is er adjustments are continuous and occur without b social knowledge that some limit is being app suming that nuclear war is avoided, the end c will surely come "not with a bang but a whimpe

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[a] Donella H. Meadows and others, *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind* (New York, Universe Books, 1972).

ENERGY RESOURCES *

Amory B. Lovins **

BACKGROUND INFORMATION

Scope and purpose

1. As medical science, by deferring death, has allowed many more people to live on the earth, so the energy of fossil fuels, by deferring physical scarcity, has kept those people alive. Medical technology has caused a population explosion, energy technology, at least for some, a wealth explosion How many people can continue to live on the earth for how long and with what wealth depends upon the ingenuity and wisdom with which man uses energy. Yet, on a planet that is round and therefore finite, energy conversion must eventually encounter some geophysical outer limit, and even sooner, it may be constrained by lack of resources, by biological side-effects, by technical problems, or by social, political and economic pressures.

2 Exploring these constraints and the ways in which they interact with the numbers and goals of people in widely differing societies is arguably the most complex problem in the world today, and one of the most important. Energy problems are inseparable from problems in almost every area of economic, foreign, industrial, agricultural and social policy Any brief survey of world energy strategies must therefore be exploratory rather than definitive, synthetic rather than exhaustive Furthermore, so many energy problems are controversial, unsolved or perhaps insoluble, that there are few easy or canonically received answers This summary of a tangled and fast-moving field cannot present a consensus where none exists, but can only suggest where the merits of a dispute may lie and undertake to represent a respectable body of technical opinion The objective of this paper is to outline certain assessments and conclusions on which much top-level energy thinking has in recent months begun to converge, presenting such information, and no more, as is needed to convey a sound grasp of the subject. [1]

Sources

3 This paper does not obscure the basic outlines of energy problems with a flood of charts, tables and graphs—in part because words tell most when spiced, not smothered, with data, and in part because so many energy data prove on close acquaintance to be inconsistent, unreliable or irrelevant A high official of the Atomic Energy Commission of the United States of America, discussing nuclear power costs, once summarized memorably (if inadvertently) the status of most energy statistics He remarked

> "Figures in the literature vary by at least a factor of ten I am not going to try to give you more accurate figures for three very good reasons
>
> "(1) They do not exist even within the Atomic Energy Commission,
>
> "(2) If they did exist they could not be released for security reasons,
>
> "(3) If they did exist and if they could be released I wouldn't believe them anyway "

Likewise, since a thorough bibliography would be far longer than this paper, highly selective references are cited only for specialized statements that might seem especially obscure or controversial, not for those based on standard sources

4 The present paper draws relatively little on the dozens of energy studies now under way in many countries, for these studies are usually of short-term national fuel policy, [2] not of long-term world energy policy, and tend to neglect such fundamental issues as the role of energy in society This paper does not go so far as to suggest (as some do) that fuel shortages should be relieved by burning energy studies, but the implications of man's energy conversions must be examined from a far wider perspective than that of the technologist, economist or other specialist alone This has been done so infrequently that no country on earth appears to have either a coherent long-range energy strategy or the institutions needed to devise one.

Time-scale

5 Since this paper is concerned with strategies far more than with tactics, it takes into consideration what must be done now and in future to produce a sustainable energy economy from the mid-1980s onwards, not what *ad hoc* programmes might extricate the world

* The original text of this paper (E/CONF 60/SYM III/12/Rev 1) was submitted to the Symposium on Population, Resources and Environment, Stockholm, 26 September-5 October 1973

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[1] No expert can tell the whole story, nor avoid emotional entanglement with particular ideas

[2] Obvious discrepancies emerge if national studies are combined Japan, for example, was for several years planning to import more petrol than anyone seems to have been planning to produce

from its current acute difficulties. These two time-scales, "strategic" and "emergency", must be carefully distinguished. The major problems today are *ipso facto* insoluble, for it takes time to solve problems, and all there is time for now is temporary expedients; but the problems of the mid-1980s and beyond might be soluble if attacked now. This paper therefore focuses directly on how to solve the problems that the world will face after immediate uncertainties have been resolved, and only indirectly on how to muddle through meanwhile. This approach is, perhaps, brutal and in no way intends to underestimate the risks to be faced over the next decade or so (e.g., the risk of further military adventures in the Middle East); but it is a necessary approach if one is to break the cycle of poor planning that has put mankind into this position. Energy strategy must, in a sense, work backwards: one must ask what cannot be done now if one is to retain the options that will be needed later. This approach leads one to conclude that most energy decisions today are based on unsound assumptions and are heading in an unsustainable direction. Those assumptions, therefore, are contrasted with other that could prove more useful.

Emphasis

6. Energy studies are traditionally built around a survey of physical inventories of fuel resources and often place less stress on constraints of production. This paper uses the opposite emphasis. A resource inventory would, by itself, be useless in understanding world energy problems, for energy constraints are not mainly dictated by physical scarcity, but are instead geopolitical, environmental and socio-technical rate and magnitude problems. Current technology makes it physically possible to convert enough energy to make the earth rather moon-like; this fact is impressive but irrelevant, since what matters is how fast and with what political and environmental side-effects human energy needs can be met. The nature of these constraints forms the focus of this paper. It also demands four departures from commonly heard economic arguments.

7. First, discussing fuel availability in purely economic, rather than in partially physical, terms—discussing reserves to the exclusion of resources, or prices to the exclusion of actual production—is not correct. Fuel minerals, unlike other minerals, are not merely dispersed, but are physically consumed by combustion: the cost of natural gas is notional once the last molecule of gas has been burned, and before that happens, the price may reflect more the exigencies of current exploitation than the long-term scarcity-value of the residual stock. Likewise, the landed price of Libyan crude is irrelevant if the Libyan Arab Republic refuses to ship any: major consumers are now discovering belatedly that it is sudden real scarcity, not rising price, that requires them to use less oil. Both these divergences of theory from reality show that money and goods are not always equivalent. Though the price mechanism rightly places a high premium on, for example, all rare minerals, it also places an exceedingly high premium on live dodos.

8. Secondly, the price of energy is, in a sense, less important to the energy planner than to the consumer. Energy prices have little to do with energy costs—especially with external (or, as Garrett Hardin calls them, "larcenous") costs—but are, instead, fixed mainly by Governments and corporations after their energy policies have been decided upon grounds other than future price. Thus, including largely fictitious energy prices in economic models of energy flows can lead to circularity.

9. Thirdly, economists tend to divide energy flows into such "black-box" categories as "supply" and "demand" or "energy sources" and "energy uses". This obscures the physical process, namely, long, continuous chains of energy conversions proceeding from various forms of high-grade energy to low-temperature heat, as required by the second law of thermodynamics. Substituting economic abstractions for thermodynamic realities leads, for example, to burning natural gas to raise steam to generate electricity to heat a house, boil water or dry clothes—which could all be done directly by the gas from three to six times as efficiently.[3]

10. Lastly, almost every economic analysis forgets that man's energy flows are not mere ciphers on a page, but part of a larger and far more complex network of natural energy flows that are often of similar magnitude. Every change man makes in natural energy flows is a biological and social act. Accordingly, this paper is about how the world works, not about the way one might wish it worked; about the functioning biological world, not an imaginary inanimate one. This approach may help us to learn from the observed working principles of a world that for 3 thousand million years has been patiently designing stable energy-consuming systems in accordance with physical law.

Units

11. Units of measure based on the Systeme internationale are used in this paper. These units are the metre (m), kilogramme (kg) and second (s). In this system, the unit of power is the watt (W). For example, one's body dissipates 100 W of heat. The unit of energy is the joule (J), equal to a power of 1 watt applied for 1 second. Conversely, a watt is a joule per second (1 W = 1 J/s). One thousand joules (1 kJ) is equal to 10^{10} ergs, or to 0.239 kilocalorie (kcal), or to 0.948 British thermal unit (BTU), or to 2.78×10^{-4} kilowatt-hour (thermal) (kWh(t)), or to approximately 3.4×10^{-5} kg of coal equivalent. Conversely, 1 metric ton (1,000 kg) of coal, or about 0.7 metric ton of oil, is equivalent to about 8.1 MWh(t)[4] or about 2.9×10^{10} J.

[3] United States of America, Ninety-second Congress, Senate, Committee on Interior and Insular Affairs, *Conservation of Energy*, prepared by H. Perry (Washington, D.C., Government Printing Office, 1972).

[4] One MW = 10^6 W = 1,000 kW = 1,000,000 W.

12 The foregoing remarks make it possible to survey very briefly the current world energy position Estimates of the current rate of man's global energy conversion disagree by ±25 per cent, but most people would agree on 8×10^{12} W as a round number. This is nearly 20 times the energy of a standard diet for the world's population as computed by the Food and Agriculture Organization of the United Nations (FAO) Thus, global industry already uses about 20 times as much energy as is recovered from all agriculture and hunting on both land and sea, and gives everyone the equivalent of about 12 hard-working slaves. [5] In density of energy per unit of continental area, human energy conversion is now about two fifths as great as net photosynthesis and is roughly equal to the natural outward flux of geothermal heat from the interior of the earth [6]

13 On a world average, human energy conversion is increasing almost three times as fast as population, i e. at about 5.7 per cent per annum, equivalent to an increase of 4.5 times by the year 2000. Annual growth is typically [7] 1-3 percentage points more rapid in poor countries than in, say, the United States of America (just over 4 per cent per annum)—which, however, with less than 6 per cent of world population, uses over one third of world energy, or roughly twice the combined total for Africa, the remainder of North and South America, and all of Asia, excluding Japan. This staggering inequality of energy distribution is among the most striking and disquieting features of the current energy picture. Gaps of one or even two orders of magnitude (= factors of 10) are common· e.g, *per capita* energy consumption is 250 times greater in the United States compared with Nigeria (Likewise, some 94 per cent of human energy conversion is in the northern hemisphere, and 75 per cent is in perhaps 0 3 per cent of the land area of the earth) [8] Yet, whatever correlation may exist between *per capita* energy conversion and various social indicators is controversial, tenuous and non-linear. Few Americans, for example, would argue that they live twice as well as the British or three times as well as the French, in proportion to their *per capita* energy conversion. Even correlations of *per capita* gross national product (GNP) (hardly a reliable social indicator) with *per capita* energy conversion show very large scatter from country to country.

14. Growth in energy conversion in the rich countries is the product of growth in population, in material consumption *per capita* and in the use of energy-intensive technologies. The first two, and probably the third, are growing exponentially in most countries. The relative weight of these three factors is speculative, though in many rich countries population growth appears to be less important than the other two combined (However, the unit environmental impact of population growth is, of course, far greater than in areas with low energy *per capita*)

15 In some of the countries with the highest gross national product, energy conversion per unit of GNP is probably increasing, owing to changes in technologies (e g, from natural to synthetic materials), and to such market shifts as electrification—heavily encouraged through advertising, promotional rates and other tactics by an energy industry that tends to identify the national interest with its own. (In the United Kingdom of Great Britain and Northern Ireland, one branch of the nationalized electricity industry will cheerfully sell an electric fire for £7, which commits another branch to installing more than £200 worth of capacity—but which successfully competes with similar promotional efforts by the nationalized gas industry.) Energy promotion has led to widespread confusion between demand and need It also supports self-fulfilling prophecy, whereby energy planners first predict a doubling of, say, electrical production in 10 years and then work hard to make it come true—and complain about how difficult it is. [9] The world-wide rush to acute epidemic "energitis" reminds many thoughtful observers of Santayana's remark· "Fanaticism consists in redoubling your efforts when you have forgotten your aim". Energy conversion seems to have become a social good to be maximized

16 The profligacy of industrial societies is founded on a pervasive attitude· that energy is a virtually free good that can be substituted for all other forms of capital (Some examples are studied below.) In most of the world, however, necessity enforces a very different attitude: that energy is an expensive good which one can scarcely afford to substitute for anything, and which one will be even less able to afford as the extravagance of others exhausts cheap reserves and drives up the price. Countries with expanding industry, rapid population growth (often with skewed age structure) and a trend towards intensive agriculture will be hit especially hard by economic energy scarcities beginning very soon. It is these countries that rising energy prices will most damage—not the industrial countries, for which far more expensive energy is long overdue

Supply pattern

17. Although no commercial source of high-grade energy can be considered in isolation, the basic global

[5] Each slave is assumed to require 175 W or about 3,600 kg cal/day—equivalent to about 0 5 kg coal per day

[6] *Inadvertent Climate Modification Report of the Study of Man's Impact on Climate* (SMIC) (Cambridge, Mass, and London, Massachusetts Institute of Technology Press, 1971).

[7] There are many exceptions, principally in countries with severe population pressures e g, energy conversion *per capita* is growing about one fourth as fast in India as in the United States of America and one fifth as fast in the European Economic Community

[8] *Inadvertent Climate Modification*, loc cit

[9] Surprisingly, many energy promoters simultaneously proclaim "Energy crisis" and "Use more"

statistics of major sources [10] are easily summarized in approximate and aggregated form:

(*a*) About 97 per cent of primary energy comes from fossil fuels, which are non-renewable except in geological time. This overwhelming commitment comprises:

(i) Approximately 38 per cent solid fuels (consumption rising relatively slowly and with fluctuations);

(ii) Approximately 40 per cent oil (consumption doubling about every decade);

(iii) Approximately 19 per cent natural gas (consumption doubling about every 7-8 years);

(*b*) Hydroelectricity provides only about 2 per cent of world primary energy, and geothermal energy far less;

(*c*) Nuclear fission, wood and other sources probably account for less than 1 per cent each;

(*d*) This global pattern masks wide regional and national variations: the United States of America uses nearly two thirds of world gas; Japan uses almost twice as much oil as coal, but almost no gas; the Union of Soviet Socialist Republics relies heavily on coal; many of the less industrialized countries have disproportionate hydroelectric production, and some burn substantial amounts of vegetation or animal wastes [11] for fuel.

Demand prospects

18. Before one critically assesses the outlook for these and other sources of primary energy, it is important to observe that many proposed technologies would make the rate of increase of world energy conversion rise even more rapidly than it currently appears to be doing. For example, modern (as opposed to traditional) agriculture already requires fossil-fuel subsidies so heavy that, according to one estimate, [12] it is often necessary to supply several times as much chemical and mechanical energy as is recovered in food—about five times as much in all food production in the United States, compared with perhaps one fiftieth in Chinese wet-rice farming. But this is only the beginning, as is shown below:

(*a*) For world food yields to keep pace with the population growth which will occur, if mortality rates do not greatly increase (due to the failure of food supply to keep pace), production of nitrate fertilizer must increase approximately 100 times in this century. (This is consistent both with projections of recent demand and with observed diminishing returns in nitrogen take-up.) Current technology—recently much improved, and probably hard to improve much further—demands about 2 kg of coal equivalent as direct energy input per kilogramme of fixed nitrogen. [13] (A breakthrough in microbiological nitrogen fixation may or may not reduce this cost.) Such energy costs imply that nitrogen-fertilizer factories alone, in the year 2000, may require about 20 per cent of current total world energy use to produce $\sim 8 \times 10^{11}$ kg nitrogen per annum.

(*b*) Desalinating sea water requires 3 kJ/litre in theory [14] about 170 in current practice and (speculatively) about 50 in very large-scale future practice. [15] The energy requirements of extensive desalination are thus impressive. For example, under reasonable assumptions, [16] desalinating enough sea water to grow one average man's subsistence crops could well require as much energy as he now uses for everything. This is to say nothing of capital, rate and magnitude, or environmental problems.

Metals further illustrate the energy-intensiveness of cornucopian technologies:

(*c*) Producing 1 kg of aluminium from alumina requires 16 MJ ($= 1.6 \times 10^7$ J) in theory, and about three or four times as much in practice—perhaps a few kWh of primary energy per beer-can. (The doubling time of world aluminium production—currently about 10^{10} kg/yr—is less than a decade.) It is less commonly realized that metals with lower binding energies but higher entropy can be nearly as energy-intensive: just mining and beneficiating ore yielding 1 kg of copper, for example, takes about 50 MJ. [17] Total direct energy inputs [18] for producing certain metals are:

(i) Copper from 1.0 per cent sulphide ore in place (1940s) $\sim$ 54 MJ/kg;

(ii) Copper from 0.3 per cent sulphide ore in place (1980s) $\sim$ 98 MJ/kg;

(iii) Aluminium from 50 per cent bauxite in place (1970s) $\sim$ 204 MJ/kg;

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[10] What is meant here, of course, is industrial energy, and one must not forget that in many countries, the main source of energy is people. People are extremely efficient users of food (if they get enough), and the food itself takes little energy to grow (see below), if energy-intensive agriculture has not yet taken over from traditional methods.

[11] India is said to burn $1-3 \times 10^{11}$ kg/yr of dung: compare this to coal consumption in the United Kingdom of 1×10^{11} kg/yr.

[12] M. J. Perelman, "Farming with petroleum", *Environment*, vol. 14, No. 8 (October 1972), pp. 8-13.

[13] G. Leach, personal communication, 1973.

[14] This calculation of the thermodynamic minimum energy is based on the osmotic pressure of salt, derived from the ideal gas law. It assumes infinitely slow, reversible desalination—hence the gap between theory and practice.

[15] A. M. Weinberg and R. P. Hammond, "Limits to the use of energy", *American Scientist*, vol. 58 (1970), pp. 412-418; A. M. Weinberg, "Nuclear energy and the environment", *Bulletin of the Atomic Scientists*, vol. 26, No. 6 (June 1970), pp. 69-74.

[16] It is assumed here that a mean-flow of 1 m³/day, desalinated by 100 MJ/m³ and pumped by 20 MJ/m³, will grow (after evaporation losses) 2,500 net recoverable kg-cal/day of protein-rich crops. These crops are assumed to form 90 per cent of the diet, and the remainder is assumed to be derived from the crops at 5:1 conversion.

[17] Organisation for Economic Co-operation and Development, *Gaps in Technology: Non-ferrous Metals* (Paris, 1969); A. B. Lovins, *Openpit Mining* (London, Earth Island, 1973).

[18] J. C. Bravard, H. B. Flora II and C. Portal, "Energy expenditures associated with the production and recycle of metals", ORNL-NSF-EP-24, Oak Ridge National Laboratory, November 1972. Transport costs for both products and raw materials are neglected; the assumed conversion efficiency of primary fuel to electricity is 40 per cent.

(iv) Magnesium from sea water (anytime) ~ 360 MJ/kg,

(v) Titanium from ilmenite in place (1970s) ~ 593 MJ/kg,

Compare combustion of coal, which yields ~ 29 MJ/kg,

(*d*) Energy costs for leaner sources will be higher in particular, comminution (crushing and grinding) of typical non-ferrous ores to liberation size now requires about 50-80 kJ/kg ore; [19] implying total production energies of the order of 10^{10} J/kg metal in a 10^{-5} "ore". This enormous energy cost is important because it appears likely that for most non-structural metals there is not a continuum of progressively poorer ores *to be mined at steadily increasing cost in energy and* land, but, rather, an abrupt grade gap, often of 10^3—10^4 ×, between mineralized and barren rock Thus, for some such metals, mining energy may rise by *orders of magnitude several decades hence*

One of the few bright spots in this outlook is that, contrary to what energy promoters often suggest, technologies for abating pollution and for recycling scarce materials are rarely energy-intensive, and often yield net energy savings. [20]

19. In summary, the current trend towards substituting energy for other resources—rich ores, fresh water, highly productive ecosystems etc.—suggests that if energy supply were not constrained in any way, demand would rise very steeply. In such circumstances, one can easily envisage, by late in this century, a doubling of current growth rates. However, this is not going to happen, and indeed the current energy growth rate cannot be maintained for long. [21] To explain why this is so, one must examine the outlook both for fossil-fuel supply and for those new energy sources which prophets of the "Second Coming of Prometheus" believe will prevent scarcity. Following this, alternative strategies and the issues they raise, including climatic constraints, are discussed

Possible rates of innovation

20. To place in perspective the supply problems of fossil fuels, one must stress a basic insight more common among engineers than among politicians' the truly formidable rate and magnitude problems of any major innovation The aggregate amounts of energy now being converted are so prodigious that voluntary rapid change in supply patterns is physically impossible. For example, suppose that the present world conversion rate of 8×10^{12} W continues to grow (as most authorities predict and urge) by about 5 per cent per annum for the rest of this century, an increase of 3.7 times to about 3×10^{13} W If one could in some way build one huge (1 GW = 1,000 MW (e) = 10^9 W (e)) nuclear power station per day for the rest of this century, beginning today, when one had finished, more than half of the world's primary energy would still come from fossil fuels, which would be consumed about twice as fast as now. This is an optimistic case, in that it is hard to think of any knowledgeable person who considers such a rapid nuclear infusion possible, even were it advisable On the other hand, such rapid sustained growth in energy conversion as has just been assumed will not actually occur, owing both to supply constraints and to the moderation in demand which these constraints will encourage and compel

Oil

21 The pattern of constraints emerges most clearly for oil, the main source of fossil energy capital (10^8-year-old sunlight) currently being consumed—and a source whose total effective lifetime will probably be 70-80 years [22] The most important single datum here is that roughly two thirds of the ultimately recoverable oil resources of the world, and a similar fraction of current reserves, are found in the unique Persian Gulf region (Most of the remainder is divided among the USSR, the western hemisphere and, to a lesser extent, Africa)

Exploration

22 Geological knowledge no longer justifies the hope that new discoveries, though they will be extensive and sometimes tactically important, will significantly alter this strategic picture The conditions necessary for the occurrence of oil, and the location of the earth's main sedimentary basins, are now sufficiently well known for total recoverable resources to be estimated with some confidence. [23] The substantial deposits which remain to be proved will not greatly shift the time of ultimate physical depletion (namely, in the first third of the next century, assuming that consumption continues to grow rapidly for the next 15-20 years, as projected by virtually all Governments) if oil consumption continues to double every decade, then a doubling of world reserves will delay depletion by only a decade

23. Indeed, to maintain a healthy ratio of reserves to production, one should find each year several new deposits, each comparable to the North Sea, or even to the Alaskan North Slope. This is not happening, and there appears to be no likelihood whatever that technical progress will make it happen, for undiscovered oil is now scarce Since the easier areas outside the well-known producing provinces have already been explored, most new exploration is now in remote, hostile and fragile environments (such as the Arctic and the outer

[19] A B Lovins, *op cit*

[20] T S Lovering, "Mineral resources from the land", in National Academy of Sciences, *Resources and Man* (San Francisco, Calif, W H Freeman, 1969), H. Perry, *op cit*

[21] The argument, implicit in much of this paper, that all energy forecasts are probably wrong, may seem a well-aimed boomerang if followed by an energy forecast It is easier, however, to forecast correctly by an energy forecast It is easier, however, to forecast correctly what will not happen than what will happen

[22] M K Hubbert, "Energy resources", in National Academy of Sciences, *Resources and Man* (San Francisco, California, W H Freeman, 1969)

[23] *Ibid*

continental shelf). Despite great effort and ingenuity, discovery rates in the United States[24] have fallen steadily from over 800 barrels[25] per metre drilled in the 1930s to perhaps 100 today,[26] and similarly abroad. Accordingly, prominent exploration experts have recently predicted that total world oil production will peak about the beginning of the 1980s and decline thereafter.

24. A few data about the widely acclaimed North Sea basin may help to put new discoveries into perspective. The entire North Sea reserves, once proved, are expected to amount to some 1.5-1.8 per cent of ultimately recoverable world resources. North Sea oil is costly to discover (about £2 million per 4,000-m wildcat hole) and to extract (about £40 million to build a single platform producing 10⁵ barrels per day, plus about £15,000 per day to run it). It will cost, from £6 thousand million to £10 thousand million to produce the likely total capacity of the North Sea, perhaps from *6 million to 8 million barrels per day* (3-4 × 10⁸ tons per annum) in the mid-1980s, yet this is not enough oil to cover the projected increase in oil consumption in Western Europe (currently about 15 million barrels per day and doubling recently every 8-10 years.[27] The required off-shore technologies, too, meet or exceed the safe limits of those now available,[28] giving rise to unknown but possibly great environmental risks, and the likelihood that the social disruption[29] of sudden industrialization will be increased by an unfavourable trade-off between the oil and fishing industries.[30]

[24] These figures are somewhat distorted by institutional forces, including peculiar United States tax laws which can encourage unsuccessful drilling. None the less, the world ratio of reserves to production has been falling for some years and shows no sign of recovery.

[25] Approximately 7 barrels (the customary unit) of crude oil weigh 1 metric ton. One barrel is thus approximately 6 GJ ≈ 5.8 · 10[illegible] J.

[26] M. K. Hubbert, *loc. cit.*

Costs

25. A short table, concentrating on broad ranges rather than on technical details, summarizes more generally the approximate costs of producing crude oil or its energy equivalent from various areas or methods—both the capital cost of 1 barrel per day and the *technical unit cost of a barrel* at the well-head (including exploration and lifting costs, but excluding carriage, taxes, producing Government's economic rent and producing firm's profit):

[27] It is not obvious, however, that the oil will stay in Europe: trans-shipment to the United States of America is a likely result of United States-Japanese competition for low-sulphur crudes. In the spring of 1973, an American oil executive made headlines at Oslo by advising Norwegians to sell their oil immediately, before it was rendered worthless by new energy sources being developed across the Atlantic: what he meant was "I want your oil now."

[28] N. Sanders, "North Sea oil: can technology cope?", *New Scientist*, vol. 56 (16 November 1972), pp. 380-382.

[29] J. Francis and N. Swan, *Scotland in Turmoil* (Edinburgh, Church of Scotland Home Board, 1973).

[30] Many would argue that the social cost of hasty oil development can be even higher: in Alaska, for example, the extinction of a native culture.

Energy source	*Capital cost (Pounds/barrels/day)*	*Technical unit cost (Pounds/barrel)*
Persian Gulf	40 — 120	0.04 — 0.08
Nigeria	250 — 330	0.16 — 0.25
Venezuela (excluding heavy oils), Far East, Australia	280 — 400	0.16 — 0.25
North Sea, most other Europe	1,000 — 1,600	0.36 — 0.80
Large deep-sea reservoirs	over 1,200?	0.80 — ?
New reservoirs in United States of America (not too remote)	1,200 — 1,600	0.80 — 1.00
Easy part of Alberta tar-sands	1,200 — 2,000	0.80 — 1.20
High-grade oil-shales	1,200 — 2,800	1.20 — 1.90
Gas synthesized from coal	2,400 — 3,200	1.20 — 2.40
Liquid synthesized from coal	2,400 — 3,200	1.20 — 2.40
Liquefied natural gas (landed)	2,400 — 5,000	1.20 — 2.40
Nuclear fission (light-water reactor)	3,500 — 5,500	?

This table makes clear the enormous leverage exerted by holders of large reserves at low technical unit cost. It is this virtual monopoly, not on energy, but on cheap energy, that is rapidly bringing the era of cheap energy to an end:[31] from now on it is a matter of what the market will bear; and it is arguable that oil will appreciate faster in free storage in the ground than oil revenues will appreciate as market investments. Such considerations helped, even before the war in the Middle East in 1973, to lead Kuwait and the Libyan Arab Republic to impose production ceilings; other Governments in the Middle East, probably excluding

[31] This has somehow come as a surprise to many: even in February 1970, the United States Cabinet Task Force on Oil Import Control could report that "we do not predict a substantial price rise in world oil markets over the coming decade". (The price was then $2 per barrel.) In the United Kingdom, documents released by the Central Electricity Generating Board in the spring of 1973 revealed the assumption that fuel costs would rise a few tens of percentage points to 1980 and remain constant thereafter. A. B. Lovins, "Things that go pump in the night", *New Scientist*, vol. 58 (31 May 1973), pp. 564-566.

Iran, may well follow suit in the next few years (regardless of the outcome of current negotiations).

Foreign policy

26 Into this volatile market, the United States of America is suddenly emerging as a major oil importer in direct competition with other buyers, both rich and poor—most notably with Japan and the European Economic Community (EEC), both already absolutely dependent upon Middle Eastern oil With its own oil and gas resources heading for virtual exhaustion by about the turn of the century [32] the United States has long planned to import about 10 million barrels per day in 1980 and twice that much (one fourth of its total energy consumption) in the mid-1980s, implying a gross annual dollar flow to the Middle East rising from about $8 thousand million currently to from $20 thousand million to $40 thousand million [33] or possibly a good deal more If the balance of payments of the United States and the productive capacities of the Middle East (both technical and political) could support such a drain, which seems implausible, the immense dollar liquidity of the producing countries would then permit disruptive short-term capital flows, price wars, heavy spending on armaments [34] and extensive downstream investment Such energy dependence can also be politically exploited [35] Strategic stockpiling of oil to reduce political risks is awkward and costly (about as much as the landed price of the oil); it is also unlikely to be sufficient for a prolonged interruption, the current Western European stock of from two to three months being perhaps a typical maximum lifetime

27. The risk run by firms investing in such capital-intensive areas as the North Sea, while other areas contain tens of times as much oil at a tenth the technical unit cost, will likewise be substantial—especially because only large fields (similar to those that now contain nearly three fourths of current reserves) can support the high cost of exploration and production in such areas. None the less, countries that believe they can retain access to off-shore reserves are, without exception, planning massive investment and immediate rapid extraction, for example, North Sea oil production in the Norwegian sector is to peak in 1977, decline to half its maximum within about four more years and decline further to almost zero by 1990 [36] (Gas production is to peak by 1980-1987) The cogent arguments [37] for delayed and stretched production appear to carry no weight with Governments whose resource decisions are apparently made by accountants on the basis of discounted cash flows

Recovery

28 Only about 30-35 per cent of the oil in place in an average reservoir is currently recovered (compared with about 80 per cent for gas, 55 per cent for underground-mined coal and 80 per cent for surface-mined coal) [38] As prices double or treble, intensified secondary and tertiary recovery may be expected to increase oil recovery by 5-10 per cent; recovery rates have risen by about 10 points in the past two decades. In some cases (e g , Venezuelan heavy oils) improvements may be greater Recoveries of the order of 50-60 per cent are not expected to become common, however, if only because the amount of energy going down the bore-hole as steam and the like soon exceeds the energy recovered as oil Substantial technical breakthroughs in low-cost recovery techniques appear unlikely

Conclusions

29 This discussion has deliberately ignored many complexities of oil, including the blending requirements of refineries, the relationships of demand for various refined products, the methods of refining various crudes into various proportions of different products, the publ c-health constraints imposed by the sulphur content of various crudes, the uncertain status of desulphurizing [illegible] ng rapidly [illegible] of siting [illegible] the consequent industrialization of, for example, the Caribbean area, the cost and side-effects of marine transport through congested shipping lanes (oil is the world's largest shipping commodity by tonnage); and the possibility that oil may become more important for its molecular structure than for its heat content (e g , more important as a petrochemicals feedstock or as a sub-

[32] M K. Hubbert, *loc cit*

[33] J E Adkins, "Oil crisis this time the wolf is here", *Foreign Affairs*, April 1973, pp 462-490

[34] Among the hidden costs of Middle Eastern oil is the cost of the weapons "needed" to "protect" it—and in turn the need to counter the destabilizing effect of those weapons

[35] As is remarked in a recent study "Co-operation between nations is highly desirable, but if undertaken to preserve energy supplies it comes near to conflicting with the unhindered conduct of an independent foreign policy which these secure [illegible]

[illegible] Eastern oil is shipped as consumers desire, resulting in excess producer liquidity (see J E Adkins, *loc cit*), local economic and political instability and war; (*b*) oil shipments are restricted, leading to economic disruption of, and military adventures in the Middle East by, consumers and hence to war; (*c*) consumers strive to ensure that they won't care whether they get the oil or not, for Western Europe and Japan, that day is far off

[36] These figures are derived from a graph in a report by the Norwegian Government, report No 51 (1972-1973), presented as part of a Ministerial briefing on oil landings They have since been confirmed independently

[37] Those arguments not yet mentioned include retaining a bargaining counter (North Sea oil no longer fills this role once extraction has begun), saving domestic reserves for the time when world prices are highest and suppliers least amiable, minimizing social and environmental disruption, evolving safer technologies and a healthy indigenous support-industry, reducing the duplication of costly facilities and the temptation to put them in inappropriate places, developing needed technical and managerial expertise at home and stretching social benefits The two critical questions to ask are· whether oil in the ground is the best investment and what will be done for an encore

[38] H Perry, *op cit*

state for single-cell protein production than as a fuel). These complexities do not, however, affect the general structure of the world oil problem: cheap oil, for long far too cheap, has now become so highly localized that it will not remain cheap—nor, on a time-scale of a few decades, plentiful. The landed prices of Middle East crudes in the EEC and in the United States, already rising steeply even before the war in 1973, will probably rise from two to four times within the next decade. Developing countries struggling to expand nascent industries will be most seriously affected. Such high prices do, of course, open up many newly competitive options; but these options take so long to develop and deploy that oil prices will go far to determine energy prices, no matter what cheaper alternatives are available on paper. Some industrialized countries may try simply to pass their extra energy costs on to others by increasing their industrial output—a sort of reverse price elasticity of demand (viable only if all countries could be simultaneous net exporters, or importers, of the same products).)

NATURAL GAS

30. Natural gas, unlike oil, is an exceptionally clean and convenient premium fuel, the use of which for low-grade purposes (e.g., raising steam) will probably be banned in most countries within a few years. The energy content of ultimately recoverable world resources is of the same order for gas as for oil, with which it tends to be geologically associated (though decreasingly so as gas exploration techniques improve). However, cheap reserves of gas may be slightly closer to depletion than those of oil because growth in demand, despite a somewhat later start, has been more rapid. (In the United States of America, for example, a very low fixed gas price had stimulated a huge artificial market which soon encountered several years ago the practical limits of domestic production rates. Gas currently provides one third of the energy and is the sixth largest industry in the United States.)[39] The Soviet Union apparently holds about one third of ultimately recoverable world gas resources, and North America and the Middle East about one fifth each.[40]

31. Gas is far more costly to transport overseas than oil. Massive efforts are currently under way to augment pipelines and the like, with liquefied natural gas (LNG) marine carriers, in order to export more gas from surplus to deficit areas (mainly Japan and the United States) and to help eliminate the flaring that still wastes a substantial fraction of gas production. This extremely expensive and demanding technology is examined below; it may only be mentioned now that its advocates expect it to grow 40-45 per cent per annum during this decade and over 7 per cent per annum thereafter.

Commitments to premium fuels

32. Short-term planning by major petroleum consumers has led to heavy and hard-to-reverse commitments of capital: e.g., some 200 million motor-cars, each burning roughly its own mass in fuel each year with about 10-20 per cent efficiency.[41] This world motor-car fleet, officially projected to double by 1985,[42] consumes as fuel about 6 per cent of all world energy (two thirds of it in the United States, where the cars are twice as large as elsewhere) and about one eighth of world oil production (close to half of the crude oil consumed by the United States).[43] The total energy cost of motor-cars, including, *inter alia*, roads, factories, sales and maintenance, is very much larger.[44] Such a politically sensitive commitment, reflected in urban and social dependence, conflicts with resource constraints that will become acute within the lifetime of motor-cars now on the road and with other politically sensitive side-effects (e.g., marine oil-spills, refinery nuisance and air pollution). Yet, the dangers of short-term transport planning still seem remote to many Governments—even in the EEC and Japan, which currently depend upon imported oil (mostly from the Middle East) for about two thirds of their energy, but which are making little effort to restrict premium fuels to non-substitutable uses.[45]

33. Short-term fuel planning can be very costly, not least in the lifetime of associated capital. As Carroll Wilson writes:

> "The painful fact is that some part of total refinery capacity, and as much as half of the planned superport capacity, will become obsolete or surplus as we carry out the shift to coal and the reduction in the proportion of our energy needs supplied by oil imports. When a problem has been neglected as long as we have ignored or misjudged the energy situation, the short-term requirements may not mesh with the requirements for the medium and longer term—and so it is in this case. We have to fix the roof and build a new house at the same time."[46]

COAL

34. Fortunately, world fossil-fuel resources are not limited to oil and gas. Coal and lignite resources which

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[39] S. D. Freeman, "Toward a policy of energy conservation", *Bulletin of the Atomic Scientists*, vol. 27, No. 8 (October 1971), pp. 8-12.

[40] The natural-gas liquids, produced together with natural gas, and subject to similar supply constraints, are not explicitly treated here. Consisting of *n*-paraffins with more than two carbon atoms, they are generally about one fifth as plentiful as crude oil, with which they may be aggregated as "total petroleum liquids".

[41] H. Perry, *op. cit.*; S. D. Freeman, *loc. cit.*

[42] G. Leach, *The Motor Car and Natural Resources* (Paris, Organisation for Economic Co-operation and Development, 1972).

[43] *Ibid.*

[44] Input-output analysis of energy consumption in the United States of America in 1963 puts the total for motor-cars at over 29 per cent. See R. A. Herenden, document No. 69, Center for Advanced Computation of the University of Illinois, Urbana, Illinois, United States of America. Estimates of the 1973 figure range upwards by as much as two times.

[45] This is one of the most important steps needed. See I. Fells and others, *op. cit.*

[46] C. L. Wilson, "A plan for energy independence", *Foreign Affairs*, July 1973.

are an order of magnitude larger—two thirds of them in Asia—await proving and extraction. Roughly 56 per cent of the ultimately recoverable coal resources of the world are in the Soviet Union and Eastern Europe, 20 per cent are in the United States, 8 per cent are in Canada, 5 per cent are in Western Europe, 1.4 per cent in Africa, 0.8 per cent in Oceania and 0 18 per cent in Central and South America [47] Much of the more accessible coal will cost tens of percentage points more than the coal currently used because of higher transport cost and the capital cost of new railways and pipelines, and not all of the cheap coal has conveniently low levels of sulphur and ash World resources of solid hydrocarbons recoverable at costs probably within a factor of from two to three of that of today are sufficient to meet projected world demand for 200-300 years,[48] though this lifetime would drop to about a century if, as appears likely, large amounts of coal were converted to synthetic fluid fuels to make up for oil and gas shortages (The complexities of, for example, coal needs for primary metallurgy, sulphur and ash content and methods of transporting coal need not be of concern on such a time-scale)

Side-effects

35 The bulk of cheap coal and lignite reserves can be extracted only by surface mining on a very large scale.[49] Long-term restorative technology, still in a rather primitive state in most countries,[50] may not be able to prevent eventual dereliction of fragile areas, though it should succeed in many others. Steep or arid land probably cannot be restored, elsewhere, great diligence and rigorous enforcement may be necessary [51] Growing resentment at past despoliation and at such side-effects as acid drainage may be expected to make large-scale coal-stripping politically awkward in such areas as the western part of the United States of America. The social costs of coal-mining, especially underground, are also high, though they could be much reduced a recently opened deep mine in Illinois is said to use every kind of safety and health precaution known, yet it is still profitable. Highly or fully automated underground mining can probably be made as economical as traditional labour-intensive methods,[52] and must be a high research priority in many industrial countries On the whole, it seems likely that an extensive clean up of coal technologies, embracing both mining and combustion,[53] would add only tens of percentage points to current costs Devising such steps to minimize social and environmental costs of coal is an especially urgent task because in many industrial countries—including the Soviet Union, the United Kingdom and the United States—coal is the bridge from the oil/gas to the energy-income economy. The responsible and orderly expansion of coal production is subject to unknown rate constraints, but they are probably not formidable It will be much easier if the industry deploys coal technologies that are much more sophisticated than those currently widely used It is a *sine qua non* for a sustainable energy economy in many countries, and would be a more efficient and long-lived use of capital than most petroleum investments

Fuel policy

36 The timing of shifts from petroleum to coal is controlled in part by private-sector market forces too subtle to explore here It is noteworthy, for example, that nearly all of the viable elements of the coal and uranium industries, part of the nuclear component industry and most of the known geothermal resources in the United States are already controlled by the oil industry—which will also soon control the new coal-conversion industry Throughout the world, corporate integration is producing energy firms with strong monopolistic tendencies This "diversification" is logical from the point of view of the firms they develop coal conversion because they have the money and geothermal power because they have the drilling technology. The implications for a competitive market-place, however, may be equally logical and rather less constructive [54] It is not clear that the United Kingdom, with nationalized coal, is really better off, for the preferences of a monopoly consumer (such as the nationalized electricity industry) can, and do, turn the price structure of principal fuels upside-down

[47] M K Hubbert, *loc cit* (People's Republic of China not included)

[48] *Ibid*

[49] This generalization must be heavily qualified if "cheap" is broadly construed If one assesses resources ultimately recoverable at any price, then most of the coal and lignite is probably deep In the United States of America, for example, only about one fourth of reserves and one twentieth of resources are strippable—still, of course, an enormous amount of coal

[50] The Federal Republic of Germany and the United Kingdom of Great Britain and Northern Ireland appear to be the most advanced In the United Kingdom, costs for restoration to grade B farm land often run about £0 58 per square metre [illegible]

[illegible] ademy of [illegible] problems [illegible] estimates [illegible] has long

advocated could, if fully developed, cost perhaps half as much as conventional underground methods

[53] A potentially limiting hazard in coal combustion, especially with coal of high ash content, is the release of large numbers of submicron particles (1 micron = 1 μ = 10^{-6} m) Such particles are very difficult to recover and can be synergistic with other emissions in their effects on public health This problem deserves close study The baroque approach now used for such awkward emissions as oxides of sulphur and nitrogen—passing them on to neighbours through a tall stack—is no longer good enough, as current studies of acid rainfall in Scandinavia are expected to show It is all the less suited for submicron particles, which can have very long atmospheric residence times

[54] Somewhat different institutional pressures in the Federal Republic of Germany are now leading to the flooding of marginal coal mines—an effective way of burning bridges behind the nuclear power programme Still another face of the same problem is the weakness of many national Governments in the face of multinational oil companies with considerably larger turnover than the gross national product of all but the richest countries

37. A brief review of the proximate causes of current (prior to the war in 1973) energy shortages in the United States may help to illustrate the failures of fuel planning that are rapidly jeopardizing stable energy supplies all over the world. Errors of management by the United States have included:

(*a*) Natural-gas prices that were too low and that destroyed "stretch" in productive capacity. (In consequence, prices must probably treble in this decade).

(*b*) Oil-import quotas that eliminated a strong reserve position: oil production in the United States has already passed its peak, and the shift from being the world's largest exporter to being the world's largest importer will be the most massive in current or future energy trade;

(*c*) Stoppage of refinery construction for environmental and economic reasons; inadequate control over refinery operation;

(*d*) Premature commitment of electric utilities to nuclear power;

(*e*) Systematic neglect and running-down of the coal industry, even though, on official projections in the United States coal consumption is to treble by 2000. (Since the Oyster Creek contract [55] was signed a decade ago, no new coal-mine has been opened anywhere in the United States without a prior long-term contract for selling the output);

(*f*) Heavy reliance of electric utilities on premium fuels;

(*g*) Generally low energy prices which, coupled with the attitude that there will always be a surplus of cheap energy, has led to extravagant use;

(*h*) Failure to anticipate and forestall the consequences of the above-mentioned policies by appropriate research and development; e.g., sophisticated coal technologies must now be imported or improvised because there is almost no domestic technical base, most of the money having gone into development of fast breeder and other fission reactors. Coal gasification can therefore make no large impact before the late 1980s;[56]

(*i*) Failure to identify and regulate gross misuses of energy, including electric space-heating; absolute rejection of energy conservation;

(*j*) Failure to maintain an adequate data base for future policy decisions;

(*k*) Failure to evolve a suitable institutional base; about 64 agencies of the federal Government now share jurisdiction over energy policy in the United States.[57] Similar errors have occurred and are continuing to occur in the United Kingdom and in most other industrial countries, where many of the decisions governing energy supply in the mid-1980s have already been taken, as a rule in a long-term policy vacuum.

"Unconventional" hydrocarbons

38. Up to this point, no reference has been made to two possible sources of reduced carbon: tar-sands, principally in Alberta (Canada); and oil-shales, principally in Colorado and Wyoming (United States of America), in South America and, perhaps, in Asia.[58]

Tar-sands

39. The Athabascan tar-sands of Alberta, in limited production since 1966, are about to enter large-scale production for United States markets. World resources are approximately from one fifth to one seventh those of liquid petroleum and are, on average, more (though not prohibitively) costly. It appears unlikely that tar-sand products will be exported from North America.

Oil-shales

40. Oil-shale resources—under pilot study for several decades in the western part of the United States of America—are potentially far larger than total world oil resources, but only if one incurs extreme costs by including submarginal shales so poor that the difficulties of production (including waste disposal) seem insuperable.[59] One can now envisage the economic recovery of only about one ten-thousandth of the total, equivalent to an order of magnitude less than world crude-oil resources. High-grade oil-shales, which are about 10-20

[55] This fixed-price contract for a nuclear power-station was regarded as the first breakthrough into competition with coal. In the event, the station was commissioned two years late at a cost overrun of 32 percent. The utility's next order for the Oyster Creek site was postponed in favour of a coal-fired station.

[56] Synthesizing liquid and gaseous fuels from coal on a large scale will be neither cheap nor easy, though it can certainly be done at a cost—perhaps, for high-BTU gas, about four to five times the current pipeline cost. The processes, particularly for high-BTU gas, are still in preliminary development, with several methods being pursued at once. Construction of production plants could begin in a few years if a high-cost, high-risk programme of parallel pilot and demonstration plants were launched now. Equally important is the development of much better technologies for burning coal: fluidized-bed combustion, a promising approach being studied in the United Kingdom and elsewhere, could be rather widely deployed in the 1980s. On coal technologies in general, see H. C. Hottel and J. B. Howard, *New Energy Technology—Some Facts and Assessments* (Cambridge, Mass., Massachusetts Institute of Technology Press, 1971); and D. A. Berkowitz and A. M. Squires, eds., *Power Generation and Environmental Change* (Cambridge, Mass., Massachusetts Institute of Technology Press, 1971).

[57] United States of America, Ninety-third Congress, Senate, Committee on Interior and Insular Affairs, *Federal Energy Organization*, Serial 93-6 (92-41) (Washington, D.C., Government Printing Office, 1973).

[58] M. K. Hubbert, *loc. cit.*

[59] On 23 November 1973, a major oil company announced its technique for *in situ* retorting, said to cost $1 per barrel in a 25-30 barrel-per-day pilot plant. Extrapolations of this operating cost (from one third to one fifth the technical unit cost suggested above) to an operation 100,000 times or more larger are speculative. Such an operation would, as the oil company agrees, require capital beyond the capacity of the oil industry to supply and would be rather slow to create. The euphoria with which *The Times* of London announced the pilot-plant results on 24 November (with a quarter of the front page plus a leader entitled "Two million million barrels at one dollar a barrel") is thus not only premature, but somewhat irresponsible. The process does not appear to affect the validity of the oil shale assessment in this paper.

per cent hydrocarbons by weight, are difficult and expensive to process, are often under several metres of overburden, occur mainly in arid regions where water-supply [60] and run-off water quality severely constrain production, produce very large amounts of intractable waste rock, and yield an oil that may require special refining methods and equipment There is no general agreement that oil-shale will ever become an important energy source, though minor production seems possible in the few regions possessing such reserves

41 One leading authority concludes that the shales "appear to be more promising as a source of raw materials for the chemical industry than as a major source of industrial energy" [61] Compared with the latter course, production of low-sulphur liquid and gaseous fuels from coal seems cheaper, easier and far nearer practicability, [62] despite its inherent inefficiency, and can be expected to compete very effectively under any foreseeable price régime (Materials-handling problems are less with coal conversion than with shale because the energy yield per ton is about four times as large.) There is also no doubt that world coal resources, though unevenly distributed, suffice to support at least a century of intensive world industrial activity, if the technical and political obstacles to their large-scale extraction and distribution can be overcome

Rate and magnitude problems

42 The physical resource base, however, is not the whole story It is hard to think of any thoughtful student of the fossil-fuel industries who believes that as world population doubles, [63] say, by the first decade of the next century, world energy conversion will increase six times (as current growth rates suggest). Even if the technical, environmental, political and institutional difficulties of such an increase could be mastered, the rate and magnitude problems appear to be well beyond the capacity of world industry and finance—especially if they are to be devoted to other problems as well In the author's view, the world would be hard-pressed to produce half that much growth in the same period, particularly since world crude-oil production will undoubtedly peak within a generation A mere doubling of world energy conversion will be hard enough

[60] For its requirement of, perhaps, 1-2 m^3 per barrel, an oil-shale industry can be expected to compete very effectively with local irrigators

[61] M K Hubbert, *loc cit*

[62] Coal conversion is water intensive, but of the nearly 200 identified sites in the United States with enough water and coal, some ought to be socially and environmentally suitable, this is likewise true abroad The side-effects of coal conversion are speculative, but probably manageable Some conversion schemes use a combined power cycle yielding both process heat (for the conversion) and electricity The complexities of high- *versus* low-BTU gasification need not be of concern here, though the former, yielding gas of pipeline quality, would be more useful for basic shifts in energy supply over large regions

[63] This assumes, for the sake of argument (and prudence), that world population will in fact double, i e, that food supply will at least do likewise, which the author considers very unlikely

43 Indeed, the exponential growth of energy conversion in any industrialized country (excluding such special cases as Norway) is the sum of a series of overlapping exponential curves representing new energy sources, each introduced as the preceding curve matures or begins to falter, and each, in general, of a simpler character than those preceding Thus, coal displaced wood, and was in turn displaced by oil and by gas (the latter, with its exceptional simplicity, accounting for two thirds of energy growth in the United States from 1945 to 1965) In most countries, domestic supplies of oil are, in turn, being supplemented by imported oil; and in some, gas by imported gas (LNG) Continued exponential growth of total energy conversion requires that each successive source be capable of more rapid growth than that preceding it—possible only if there is a very large existing energy inventory capable of being cheaply and rapidly mobilized, as was historically true of oil in the Persian Gulf and natural gas in the United States of America

44 Governments have apparently acceded to quick depletion of cheap energy reserves on the tacit assumption that a new source will turn up in time to maintain ever faster growth The most recent such innovation, however, is nowhere in sight, and a little reflection about the character such a new source must have makes clear the reason Nuclear power, with its complexity and long lead times, is far too slow Existing energy industries are thus under severe stress to try to make up a growing deficit (In the United States of America, for example, gas and oil fields—and the refineries of the major producers—are operating at 100 per cent, or somewhat more, of their nominal maximum capacities) This stress is in a sense due, as is often said, to a temporary shortage (of, e g, refinery capacity) caused by prolonged mismanagement, but the underlying problem is real and will not go away

Non-fossil-fuel options

45 It is therefore time to examine the short-, medium- and long-term options that energy technologies not based on fossil fuels may offer These options are of a character ranging from exceptionally simple to exceptionally complex; and it is here, in the realm of potential innovations, that the political, environmental and social side-effects of new technologies need the most careful assessment, bearing in mind the very different needs and aspirations of different cultures It is easy, for example, to fall into the trap of assuming that a particular technology is insignificant on a world scale because it can supply only, say, 1 per cent of world energy needs. What matters is not aggregate energy production, but the ability of a technology to meet the energy needs of people in particular circumstances. A highly diffuse, low-intensity energy source might be ideal for a dispersed rural population. It would be imprudent for even the most hi[illegible]rbanized and industrialized countries to [illegible] will

not or should not have substantial populations in this circumstance.

NUCLEAR FISSION

46. The promised innovation upon which most energy planners have relied for the past two decades, apparently without considering how rapidly it can be deployed, has been nuclear fission—the extraction of heat from fissile (or, indirectly, from fertile) isotopes. This technology has received an enormous amount of highly skilled and dedicated attention for several decades. Yet, the United Kingdom, the country now most heavily reliant on fission, generates only a tenth of its electricity in this way; and in the United States, after 25 years and thousands of millions of dollars spent in research and development, nuclear power has only just surpassed fire-wood [64] as an energy source. Indeed, it was not until 1971 that the total electricity production of all nuclear power-stations in the United States exceeded the electricity consumption of the gaseous-diffusion plants used to enrich uranium. In short, nuclear power has been very slow in arriving. Nevertheless, its advocates claim that it is poised for a remarkable spurt of growth with a doubling time of the order of a few years—sufficient to take over the role of faltering gas production in maintaining the world energy doubling time of about 12.5 years. Most energy planners share this view.

47. Limited but acrimonious public debate over whether this is possible or wise has exposed a deep division of opinion within the scientific community over fundamental technical and moral issues raised by nuclear fission. Because this controversy is so crucial to any assessment of future energy supply, it is worth analysing at some length. If the present summary seems critical, however, no reflection is intended on the motives of anyone engaged in promoting or developing nuclear fission. Decent, sincere people, perhaps caught up in the momentum and the intense social pressures of a committed organization, naturally like to think that what they are doing is worth while, and are not always so concerned with gaps between intention and performance.

Issues

48. The problem of evaluating fission technology has been well stated by Kneese:

"It is my belief that benefit-cost analysis cannot answer the most important policy questions associated with the desirability of developing a large-scale, fission-based economy. These questions are of a deep ethical character. Benefit-cost analysis certainly cannot solve such questions and may well obscure them. . . .

"[T]he advantages of fission are much more readily quantified in the format of a benefit-cost analysis than are the associated hazards. Therefore there exists the danger that the benefits may seem more real than the hazards. We are speaking of hazards which may afflict humanity many generations hence and distributional questions which can neither be neglected as inconsequential nor evaluated on any known theoretical or empirical basis. This means that technical people . . . cannot legitimately make the decision to generate such hazards on the basis of technical analysis." [65]

Kneese is arguing, then, not merely that the benefits and risks of fission technology have been insufficiently quantified to support a benefit-cost judgement, but, further that such a judgement could not be technically valid. It is appropriate here to explore the reasoning behind this opinion.

49. The very large inventories of fission and activation products in the nuclear fuel-cycle give rise to risks [66] unlike those of any other single technology. These risks combine the geographical range of military pathogens, the permanence of irreversible changes in climate or in soil fertility and the medical and moral significance of the most persistent synthetic mutagens. Because the unique hazards of nuclear fission depart so much from man's experience, before one chooses to incur those hazards one must define, with special care, the limits of man's ability to cope with them.

50. Most fission technologists realize that they are creating new categories and magnitudes of risk, and they respond with clever precautions. But by stressing the great care that they take, fission technologists evade the central question—whether the safety problems of fission are too difficult to solve. If they are, then one cannot claim that they are solved by pointing to all the efforts made to solve them. [67]

An engineering problem or a people problem?

51. It is impossible to prove, except by experiment, whether the safety problems of widely proliferated fission technology are too difficult to solve. In assessing the risks of a complex technology in which "no acts of God can be permitted", [68] one can only rely on analogies with other highly engineered systems that have risks several orders of magnitude smaller and quite different in kind. Such analogies suggest that safety in nuclear fission is ultimately limited, not by man's care or ingenuity (as has been true of all previous technol-

[64] Fire-wood provided three quarters of the energy in the United States of America in 1870, when the population of the country was one fifth of the current total and energy conversion *per capita* was two sevenths. (See S. D. Freeman, *loc. cit.*) Some observers believe that contribution of wood is underestimated and still exceeds that of fission.

[65] A. V. Kneese, "What will nuclear power really cost?", *Not Man Apart*, vol. 3, No. 5 (May 1973), p. 16. Based upon testimony at the hearings of the United States Atomic Energy Commission on the nuclear fuel cycle, November 1972.

[66] For an excellent topical assessment, see D. F. Ford and others, *The Nuclear Fuel Cycle* (Cambridge, Mass., Union of Concerned Scientists, 1973).

[67] H. Alfvén, "Energy and environment", *Bulletin of the Atomic Scientists*, vol. 28, No. 5 (May 1972), pp. 5-7.

[68] *Ibid.*

ogies),[69] but by his inescapable human fallibility limited not by man's ability to solve problems on paper, but by his ability to translate paper solutions into real events. If this view is right, then nuclear safety is not a mere engineering problem that can be solved by sufficient care, but rather a wholly new type of problem that can be solved only by infallible people Infallible people are not currently observable in the nuclear or any other industry.

52. International experience at many stages of the nuclear fuel cycle supports the thesis that describing nuclear safety problems as "amenable to engineering solution" confuses the way things are with the way one would like them to be. This experience shows that people have impressive talents in overcoming foolproof systems and suggests that catastrophes have so far been averted more by luck than by design

53 Fallibility will find its greatest scope for expression in three exercises: containing radio-isotopes within the nuclear fuel cycle, containing them after they have been rejected as wastes and containing strategic materials Such "fallibility problems" can be expected to become more prominent as reactors proliferate, investment conquers caution, boredom replaces novelty, routine dulls commitment and less skilled technicians take over (especially in countries with "comparatively low levels of technological competence and a great propensity to take risks") [70] The third of these problems—perhaps the most critical—is discussed below, together with some risks of non-nuclear energy technologies; the other two are briefly discussed here

(*a*) Failure of containment appears to be most likely in three phases of the fuel cycle

(i) *Reactor operation* (where radio-active inventories are of the order of 10^{10} curies [71] and where the consequences of a failure could include 10,000 or more deaths, numerous injuries of widely varying induction time and property damage of the order of £10^{10}) Failure may be induced by disruptive energy releases (chemical or nuclear), mechanical or cooling faults, acts of war or sabotage The last two of these risks, the difficulty of decommissioning, and perhaps the magnitude of potential radio-active releases in any accident [72] could be much reduced by underground siting This procedure would cost about the same [73] but has attracted almost no official interest,[74] despite the likelihood that "fission plants will be enormously attractive objects for sabotage and blackmail" [75] Alternatively, risks can be greatly increased by raising power density, as in large light-water reactors [76] or in fast-breeder reactors (~400 kW/litre) [77] The disposition, during an accident, of a fast breeder's fissile inventory (including ^{239}Pu [78] equivalent to about 100 bare-sphere critical masses) cannot be predicted for a partially molten core affected by sodium flow or compression waves It is difficult to see how any convincing assurance against a Bethe-Tait accident (critical reassembly) can be

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[69] Save, perhaps, manned space flight In *The New Yorker*, 11 and 18 November 1972, H S F Cooper, Jr, gives a fine account of the impact of human fallibility on a highly engineered system (Apollo 13) It has also been stated that "three astronauts were incinerated due to a very straightforward accident in an extremely high technology operation where the utmost precautions were allegedly being taken" (See A V Kneese, *loc cit*)

[70] A V Kneese, *loc cit*

[71] One curie = 3 7 × 10^{10} disintegrations per second, roughly the activity of a gram of radium, limiting body burdens of the more dangerous radio isotopes are typically measured in millionths of a curie or less

[72] It is often assumed that impermeable rock is a sufficient bar to the escape of volatile and semi-volatile fission and activation products after a core meltdown This is not necessarily the case Small or slow leakages are important, shafts must somehow be infallibly sealed, and contact with moisture would evolve prodigious quantities of steam hydrogen, etc

[73] F C Rogers 'Underground nuclear power plants", *Bulletin of the Atomic Scientists*, vol 27, No 8 (October 1971), pp 38 41, B J Smer [illegible]
demonstration plant [illegible]
N Y, Hudson Instit [illegible]
ATR-72 (S7263) [illegible]
Laboratory Report [illegible]
Oak Ridge National [illegible]

[74] In the United States of America, the Atomic Energy Commission recommended it to the President in 1962 The proposal sank without trace, presumably because awkward questions might be asked about reactors already built on the surface

[75] J T Edsall, letter to the editor *Science* vol 178 (1972), p 933

[76] It is often claimed that the probability of major component failures in these reactors is extremely low but that is not really known The contrary is suggested in United States of America Atomic Energy Commission (USAEC), *Reactor Operating Experiences*, and in R L Scott, 'Safety related occurrences in nuclear facilities", report ORNL-NSIC 91, 1970 The USAEC report WASH 1250, July 1973, estimates that the probability of primary coolant pipe rupture might be about 10 [illegible] per reactor year and that of emergency coolant injection 10 [illegible] per demand—clearly intolerable levels (A senior USAEC official has estimated that a mature nuclear economy in the United States could expect a major reactor accident about every decade) But designers and accident analysists are also fallible "Incredible" incidents in which many redundant systems have failed simultaneously ("common mode failure"), or [illegible]

Bethesda rule-making hearing (USAEC RM 50-1) to conclude that 'the reliability of 'defense in depth is still in question"

[77] High power density and high plutonium content mean shorter thermal and neutron-physics time constants, placing a heavy burden on control systems and on any negative coefficients of reactivity Large stresses and high temperatures also aggravate metallurgical or geometric faults in materials whose long term behaviour under extreme neutron flux is still mainly conjectural

[78] Plutonium 239 is an artificial radio isotope with a half-life of 24 400 years It is made by bombarding uranium 238 (^{238}U) with neutrons It is pyrophoric and reactive is a hard alpha emitter, is a bone-seeking poison similar to radium, but several times as toxic and is one of the most hazardous substances known Its most hazardous form may be the respirable dioxide particles produced by combustion—of order 10^{10} particles per gram of metal with each particle suspected of carrying a substantial risk (perhaps 1 per cent or more) of lung cancer The plutonium in breeder reactor fuel is already oxidized into a refractory ceramic which, it is claimed cannot produce respirable particles It appears plausible, however that, in an accident, the sodium coolant in a breeder should be easily reactive enough to reduce the dioxide fuel back to plutonium metal Current breeder safety analyses do not appear to take this possibility into account

not or should not have substantial populations in this circumstance.

Nuclear fission

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47. Limited but acrimonious public debate over whether this is possible or wise has exposed a deep division of opinion within the scientific community over fundamental technical and moral issues raised by nuclear fission. Because this controversy is so crucial to any assessment of future energy supply, it is worth analysing at some length. If the present summary seems critical, however, no reflection is intended on the motives of anyone engaged in promoting or developing nuclear fission. Decent, sincere people, perhaps caught up in the momentum and the intense social pressures of a committed organization, naturally like to think that what they are doing is worth while, and are not always so concerned with gaps between intention and performance.

Issues

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> "It is my belief that benefit-cost analysis cannot answer the most important policy questions associated with the desirability of developing a large-scale, fission-based economy. These questions are of a deep ethical character. Benefit-cost analysis certainly cannot solve such questions and may well obscure them. . . .
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> "[T]he advantages of fission are much more readily quantified in the format of a benefit-cost analysis than are the associated hazards. Therefore there exists the danger that the benefits may seem more real than the hazards. We are speaking of hazards which may afflict humanity many generations hence, and distributional questions which can neither be neglected as inconsequential nor evaluated on any known theoretical or empirical basis. This means that technical people . . . cannot legitimately make the decision to generate such hazards on the basis of technical analysis." [65]

Kneese is arguing, then, not merely that the benefits and risks of fission technology have been insufficiently quantified to support a benefit-cost judgement, but, further that such a judgement could not be technically valid. It is appropriate here to explore the reasoning behind this opinion.

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An engineering problem or a people problem?

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52 International experience at many stages of the nuclear fuel cycle supports the thesis that describing nuclear safety problems as "amenable to engineering solution" confuses the way things are with the way one would like them to be. This experience shows that people have impressive talents in overcoming foolproof systems and suggests that catastrophes have so far been averted more by luck than by design

53 Fallibility will find its greatest scope for expression in three exercises containing radio-isotopes within the nuclear fuel cycle, containing them after they have been rejected as wastes and containing strategic materials Such "fallibility problems" can be expected to become more prominent as reactors proliferate, investment conquers caution, boredom replaces novelty, routine dulls commitment and less skilled technicians take over (especially in countries with "comparatively low levels of technological competence and a great propensity to take risks") [70] The third of these problems—perhaps the most critical—is discussed below, together with some risks of non-nuclear energy technologies; the other two are briefly discussed here

(*a*) Failure of containment appears to be most likely in three phases of the fuel cycle

(i) *Reactor operation* (where radio-active inventories are of the order of 10^{10} curies [71] and where the consequences of a failure could include 10,000 or more deaths, numerous injuries of widely varying induction time and property damage of the order of £10^{10}). Failure may be induced by disruptive energy releases (chemical or nuclear), mechanical or cooling faults, acts of war or sabotage The last two of these risks, the difficulty of decommissioning, and perhaps the magnitude of potential radio-active releases in any accident [72] could be much reduced by underground siting This procedure would cost about the same [73] but has attracted almost no official interest,[74] despite the likelihood that "fission plants will be enormously attractive objects for sabotage and blackmail" [75] Alternatively, risks can be greatly increased by raising power density, as in large light-water reactors [76] or in fast-breeder reactors (~400 kW/litre) [77] The disposition, during an accident, of a fast breeder's fissile inventory (including ^{239}Pu [78] equivalent to about 100 bare-sphere critical masses) cannot be predicted for a partially molten core affected by sodium flow or compression waves. It is difficult to see how any convincing assurance against a Bethe-Tait accident (critical reassembly) can be

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[71] One curie = 3 7 × 10^{10} disintegrations per second, [illegible] burdens [illegible] measured [illegible] sufficient bar to the escape of volatile and semi-volatile fission and activation products after a core meltdown This is not necessarily the case Small or slow leakages are important, shafts must somehow be infallibly sealed, and contact with moisture would evolve prodigious quantities of steam, hydrogen, etc

[73] F C Rogers Underground nuclear power plants", *Bulletin of the Atomic Scientists* vol 27, No 8 (October 1971), pp 38-41, B J Smer[illegible] demonstration plant [illegible] N Y Hudson Instit[illegible] ATR-72 (S7263) 1, [illegible] Laboratory Report [illegible] Oak Ridge National Laboratory, August 1966

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[77] High power density and high plutonium content mean shorter thermal and neutron physics time constants, placing a heavy burden on control systems and on any negative coefficients of reactivity Large stresses and high temperatures also aggravate metallurgical or geometric faults in materials whose long term behaviour under extreme neutron flux is still mainly conjectural

[78] Plutonium-239 is an artificial radio isotope with a half-life of 24,400 years It is made by bombarding uranium-238 (^{238}U) with neutrons It is pyrophoric and reactive, is a hard alpha emitter, is a bone-seeking poison similar to radium, but several times as toxic and is one of the most hazardous substances known Its most hazardous form may be the respirable dioxide particles produced by combustion—of order 10^{10} particles per gram of metal with each particle suspected of carrying a substantial risk (perhaps 1 per cent or more) of lung cancer The plutonium in breeder reactor fuel is already oxidized into a refractory ceramic which, it is claimed, cannot produce respirable particles It appears plausible, however, that, in an accident, the sodium coolant in a breeder should be easily reactive enough to reduce the dioxide fuel back to plutonium metal Current breeder safety analyses do not appear to take this possibility into account

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NUCLEAR FISSION

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given. [79] Super-prompt criticality, resulting in a substantial nuclear explosion, is probably much less likely than a low-yield disassembly—a nuclear fizzle—sufficient to breach containment and release the transuranic and fission-product inventory. There is virtually no limit to the size of the catastrophe that this mechanism could produce;

(ii) *Transport of irradiated fuel.* It is impossible to design a shipping cask that can withstand all accidents, let alone sabotage. Risks will increase with proliferation, especially with a ^{239}Pu economy. The United States of America envisages 100 railway shipments daily; a single fast-breeder fuel discharge would contain 500 million curies of activity and emit 1.7 MW of heat;

(iii) *Reprocessing of irradiated fuel.* Excluding criticality accidents, internal energy release is less likely here than in a reactor; but the containment is generally less, and the radio-active inventories and concentrations are vastly larger. A more lethal target for acts of war or acts of God can hardly be imagined: a major release could make large regions permanently uninhabitable. The ^{239}Pu inventory of 1-3 tons in a fast-breeder reactor poses a formidable containment problem because of its extreme toxicity. A lethal dose for everyone on earth could probably be contained in a piece the size of an orange. World inventories are planned to rise rapidly from a few tens of tons now to hundreds of tons in the early 1980s and thousands several decades hence. Some radio-isotopes mobilized by the nuclear fuel cycle, e.g., ^{226}Ra and its decay products (released in uranium mining and milling), deserve, but seldom receive, proper containment;

(*b*) High-level wastes emerging from the nuclear fuel cycle can be converted from corrosive solutions to stable solids with technologies currently in hand. This rational precaution will reduce the risks of temporary storage, but brings the world no closer to discovering a method of permanent disposal—of perpetual and infallible isolation from the biosphere. The volume of highly active material requiring such disposal is still relatively small, but is growing rapidly (to an order of 10^{11} curies by 2000), and its potency per unit volume is very great. [80] The lifetime of that potency—of the order of 1,000 years for fission products and 1,000,000 years for transuranic activation products [81]—subjects any terrestrial disposal scheme to geological requirements of which man has no experience and for which no responsible geologist can offer a guarantee. Terrestrial disposal, e.g., in basement rock or in salt beds, must therefore be "retrievable"—and, hence, requires surveillance on a time-scale far exceeding the observed life span of human cultures. Since safe extraterrestrial disposal is neither technically nor economically feasible, one could properly conclude that, as a technical problem, high-level waste disposal is probably insoluble even with large amounts of money; and that as a moral problem, it should be a deep concern. (Disposal of low- and medium-level radio-active wastes—solid, liquid and gaseous—is, perhaps, a less serious problem, but is still very important, especially in cumulative impact, and is seldom dealt with properly.)

Fission economies

54. It is instructive to contrast with these considerations the proposal of two prominent American energy planners to build 4,000 seaside fission "parks", each producing 40 GW (e) and nearly twice that much heat, and all producing a total of 7×10^{11} curies per annum of long-lived activity. [82] The fuel would be about 1.8×10^{8} kg per annum of ^{238}U and ^{232}Th, derived from about 5.5×10^{12} kg per annum of granite (about twice the current world consumption of coal) and converted, respectively, to ^{239}Pu and ^{233}U. This scheme represents an increase of 50 times in total human energy conversion. The accompanying commitment of humanity "to exercise great vigilance and the highest levels of quality control, continuously and indefinitely" [83] has led some to propose a self-perpetuating "technological priesthood". [84] Others reply that the required social stability "has not existed in the past, does not exist now and offers no promise of existing in the near future"; that "even devoted priests are human"; and that the importance of the "priesthood" proposal resides in the support it lends to the view that the technical and social problems of the fission economy have no realistic solutions. [85]

55. Though the economics of such an energy increase (50 times) depend upon, and are as speculative as, those of the fast-breeder reactor currently under development, [86] it is important to note, in view of the special

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[79] Elaborate computer calculations have been made of the course of disassembly after assumed reassembly accidents. Basic physical understanding of the course of reassembly, however, is inadequate for the task and has progressed scarcely at all in the past two decades.

[80] The volumes involved are sometimes referred to in reassuring units such as matchboxfuls *per capita*. The risk associated with such seemingly small amounts, however, is altogether foreign to common experience; see the remarks about plutonium toxicity in footnote 78.

[81] D. J. Rose and A. S. Kubo (Nuclear Engineering Department, Massachusetts Institute of Technology), in a useful paper, "On disposal of nuclear wastes" (to be published), discuss the separation of these two categories so that the actinides can be burned in a reactor. The practical advantages of such a scheme, though perhaps substantial, do not appear to be as large as is claimed.

[82] A. M. Weinberg and R. P. Hammond, *loc. cit.*

[83] A. V. Kneese, *loc. cit.*

[84] A. M. Weinberg, "Social institutions and nuclear energy", *Science*, vol. 177 (1972), pp. 27-34.

[85] J. T. Edsall, *loc. cit.*

[86] A. B. Lovins, in *Hearings on the LMFBR demonstration plant*, United States Congress, Joint Committee on Atomic Energy, 8 September 1972, pp. 120-130; excerpted, "Case against the fast breeder reactor", *Bulletin of the Atomic Scientists*, vol. 29, No. 3 (March 1973), pp. 29-35. A forthcoming survey by T. C. Cochran (Resources for the Future, 1974) goes into far greater economic detail. The breeder programme in the United States is now well known to be in such economic trouble that *The New York Times* could comment editorially (30 October 1973): "The drawbacks of the breeder, its

(Continued on next page)

hazards of fast-breeder technology[87] and of the ^{239}Pu economy,[88] that projected populations of thermal (non-breeder) reactors could be economically fuelled for several centuries unaided by any breeder reactors at all This is because the cost of uranium feed-stock (U_3O_8) is only a few percentage points of the sent-out cost of nuclear electricity;[89] hence, the latter is insensitive to the former An increase of $1 per pound ($2 2 per kg) in the price of U_3O_8 would increase the marginal cost of bulk electricity from a 1-GW(e) pressurized-water reactor[90] by only 0 052 m$/kWh without, or 0 034 m$/kWh with, Pu recycle,[91] the cost increase would be less for the consumer, who also pays fixed distribution costs, and should be similar for gas-cooled reactors Thus, an increase of 10 times in U_3O_8 price—enough to increase, for example, reserves in the United States by more than 2,000 per cent[92] without requiring environmentally unacceptable mining methods,[93] and, similarly, in many other countries[94]—would increase the bulk price of current nuclear electricity by about 18-27 per cent, trivial compared with increases in other energy sectors[95]

Sources of delay

56 Public awareness of the issues raised by nuclear fission is now sufficient to make fast proliferation of this technology difficult in many countries despite its immense political, economic and institutional momentum Fuelled both by deep and rapidly growing anxiety in the technical community (especially in the United States)[96] and by the obvious need for any re-evaluation to begin at once before the commitment becomes irreversible, public debate will quickly expand and intensify Rapid shifts in opinion are illustrated by recent actions of official bodies in both the Federal Republic of Germany[97] and Sweden[98]

57 Perhaps surprisingly, however, the much-publicized delays in reactor commissioning in the United States in the past few years, and the failure of currently planned reactors to meet more than half of the trend projection for the early 1980s, have been due almost entirely to poor management, manufacturing and labour difficulties, poor quality assurance,[99] unexpected technical snags and the other standard problems of rapid high-technology proliferation—not to

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expense, dangers and complexities even beyond those of today's light water reactors, have grown more worrisome under less partisan analysis, these reservations have apparently now reached the top echelons of the White House" See also R Gillette, "One breeder for the price of two?", *Science*, vol 182, No 38 (5 October 1973), p 38 Gillette reports that the capital costs of the demonstration breeder currently exceeds $12,000/kW (*cf* about $56/kW for a PR) The breeder programme in the United States, like the light-water reactor

at simple interest, is about 24 years, in contrast to the British claims of 12 for Dounreay (Many observers consider the burn ups and neutron fluxes implied by the latter figure to be rather implausible) If the pipeline inventory of ^{239}Pu for a new breeder is only as large as the core inventory, then a United States breeder can fuel another in about 48 years The breeder populations projected by the United States Atomic Energy Commission for the year 2000, therefore, appear to entail a ^{239}Pu requirement far too large to meet even if weapons stockpiles are released Similar questions may arise in other

[89] C
nuclear
speech S
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[90] United States of America, Atomic Energy Commission, WASH-1139 (Rev 1), December 1971, p 10

[91] C E Larson, Commissioner, United States Atomic Energy Commission, personal communication, 2 November 1972

[92] United States of America, Atomic Energy Commission, "US January 1, 1971 high cost uranium resources—$30 to $500/lb U_3O_8", unpublished sheet dated "9/1/71" (The

various prices from resources in the United States", United States Bureau of Mines report IC-8501, Washington, D C., 1971

[94] Uranium and, for that matter, thorium, are surprisingly widely distributed, though many of the richer deposits are in North America, Southern Africa and Australia A prominent French official, however, has recently estimated that France alone could supply the U_3O_8 needs of the European Economic Community for well over a century at about $40 per pound

[95] Cost comparisons between fission and fossil-fuel power are meaningless in any case because of strong government

incentives" aiding mainly the former (Incentives cost the same as subsidies, but sound nicer)

[96] Warnings have come from such sources as the Rand Corporation, "California's electricity quandary", September 1972, the Federation of American Scientists, *FAS Newsletter*, February 1973, two former top officials of the United States Atomic Energy Commission (USAEC), and scientists and engineers of stature On 26 October 1973, the Council of the American Physical Society (APS) backed its distinguished working party, which had concluded, after briefings by top USAEC and other safety experts, that APS should conduct a prompt and independent technical study of reactor safety

[97] On 23 August 1972, witnesses for the Consolidated National Intervenors in the Bethesda ECCS rule making hearing
Presseski,
Reactor
Atomic
orandum,
based on a meeting between Mr Presseski and Mr Sahl, head

report was incorrect and due to a misunderstanding by Mr Presseski The 1972 *Tatigkeitsbericht* of the Institut fur Reaktorsicherheit further reports an indefinite delay in the

later erroneously implied that the Swedish Parliament had not decided to suspend ordering of reactors not already formally committed—i e, those to be installed after about 1979 Such a ban is in effect until further information is laid before Parliament This information—now being prepared—will apparently be *pr forma*, but the Parliament appears likely to demand a thorough reassessment instead, so the matter may not be resolved in 1974, as originally expected

[99] Rand Corporation, *op cit*, cites "increasing reports of poor quality control and documented carelessness in manufacture, operation, and maintenance", many reports of the United States Atomic Energy Commission tell the same story The result, as the president of Consolidated Edison reported it recently, is that the 18 longest running commercial nuclear stations in the United States averaged 61 9 per cent of their potential output through 30 September 1972 Four approached 80 per cent, but three of these later broke down, eight of the 18 were running at about half capacity

public resistance or intervention in licensing proceedings (despite very serious doubts [100] about the operating safety of light-water reactors in the United States). It is these former conventional constraints, the rate and magnitude problems stressed earlier, that will prove decisive in preventing fission from meeting projected short- and medium-term demand. Nuclear power does not represent a large reservoir of cheap energy capable of being mobilized very simply and quickly; it is, on the contrary, one of the most complex and unforgiving technologies known to man. Some people still think that nuclear capacity in, say, the United States, will increase 250 times by 2000 and that the equivalent of total current electrical capacity in the United States will then be built every 24 months. There is no accounting for what some people think.

NUCLEAR FUSION

Prospects

58. There is perennial speculation, and much misunderstanding, about a nuclear technology whose scientific feasibility, unlike that of fission, remains to be proved (probably in the next decade). Nuclear fusion could be practically free of resource constraints, since the ^{2}H (deuterium), easily extractable from sea water, [101] represents about 500,000 times the energy content of all fossil fuels. (Lithium reserves, adequate for a few centuries, could also provide an easier thermonuclear reaction.) It is this feature of fusion that has led to many years of research in several technologically advanced countries. It is likely, though not certain, that at least one of several promising approaches [102] will succeed. This could lead to a commercial prototype around the last decade of this century, at a cost of the order of £1,000 million, followed by the usual problems of rate and magnitude associated with proliferation. Such a device (whose economics are completely conjectural) will probably be extremely complex, and it seems implausible that the needed technology would be made freely available to all Governments (as the fuel would).

Side-effects

59. The safety problems of a practical fusion reactor cannot be assessed without building one—a course of action that can be argued to be prudent, if feasible. Sources of disruptive energy release may include strong magnetic fields and large inventories of molten lithium (comparable to the molten sodium in a fast breeder). The reactor could not get out of control nor produce strategic materials. [103] The inventories of radio-active products would be significant (of order 10^8 curies of ^{3}H); but could, in theory, be recycled as fuel. The main problem would be activation products produced by the intense neutron flux of the reactor, comparable to that in the core of a fast breeder. The theoretical biological significance of these products [104] may, on current estimates, be an order of magnitude smaller than in a comparable fission reactor. Unless it is many orders of magnitude smaller than that—which is possible, but not yet plausible [105]—fusion does not represent an attractive long-term energy source, though in the medium term it is almost certainly preferable to fission. One could argue, further, that if fusion turned out to be a clean, cheap and safe energy source, [106] man would lack the discipline to manage it so as to prevent serious ecological and climatic damage. This topic is discussed later in this paper. Recent history does not say much for man's responsibility in managing large stocks of energy. This argument suggests that fusion is not a panacea and may bring more problems than it solves: thus, that no attempts should be made to develop fusion power unless it is quite certain that man will have the technical options and the political will to reject it if necessary.

GEOTHERMAL POWER

60. Another possible energy source which could be considered consumption of capital rather than of energy

[100] The depth and basis of these doubts is seldom realized by those unfamiliar at first-hand with the enormous public record of the Bethesda ECCS rule-making hearing (USAEC RM-50-1). This record shows that most of the top safety experts of the Atomic Energy Commission believe there is insufficient technical basis for establishing adequate margins of safety (and hence for licensing the reactors). The public position of AEC on light-water reactor (LWR) safety is flatly contradicted both by the sworn public testimony and by the published internal documents of a very substantial fraction of its own senior staff and advisers, including those at the highest levels. No ordinarily prudent man with full, recent and direct knowledge of the Bethesda record could possibly decide to order light-water reactors. The readiness of many responsible people to do so shows how far the reactor salesmen have outrun not only reactor engineers, but the free flow of information through committed institutions. The best available summary of the Bethesda record is the annotated, semi-technical *Concluding Statement* (Cambridge, Mass., Union of Concerned Scientists, 1972). It is strongly recommended. For political background, see also the four-part series in *Science*, vol. 177 (September 1972), on "Nuclear safety": I, "The roots of dissent" (1 September), pp. 771-772; II, "The years of delay" (8 September), pp. 867-871; III, "Critics charge conflict of interest" (15 September), pp. 970-975; IV, "Barriers to communication" (22 September 1972), pp. 1080-1082.

[101] It is generally assumed that traces of deuterium in sea water have no biological function: nobody really knows.

[102] Magnetic confinement of plasmas is now within about an order of magnitude of the goal. No fundamentally new mistake has been made for several years; on the contrary, some 175 types of plasma instabilities have now been classified. Laser implosion of pellets is conceptually simpler, but poses awkward materials problems. It may also have military implications.

[103] Tritium and other light nuclei might be considered a trivial exception.

[104] The difference between theoretical and actual containment could be as important for fusion as for fission: fallibility and economic expedience could compromise safety analogously in both cases.

[105] This depends mainly upon how wide the choice of materials for the containment structures turns out to be. Alternatively, if extremely high temperatures can be attained, it may be possible to use certain fusion reactions which release no neutrons; this process would be far more difficult than the reactions currently contemplated, but would virtually eliminate activation products.

[106] Some would say that no nuclear source can be clean and safe; and that though nuclear power is admirable when properly sited, the source and user should be rather widely separated—say, about 150 million km.

income[107] is geothermal heat, now drawn only locally in the form of hot water and dry steam Some research, of which there has been far too little, suggests that geothermal energy from hot dry rock, if obtainable, might be cheap and abundant enough to have a profound influence on world energy supplies. Side-effects are still speculative, but they could well be more acceptable than those of fossil fuels, despite low thermal efficiency Little more can be said of this source[108] until further research is completed a few years hence

Sources of energy income

61. Having exhausted the known categories of energy capital usable in large amounts, the discussion now turns to possible technologies for exploiting energy income—energy flows which natural processes make continuously available, regardless of whether they are tapped Such techniques, suitably deployed, are perfectly capable of providing as much energy as mankind could reasonably need

Tides

62 Tides, the only such source not activated by the sun, can provide locally large blocks of physically clean (if ecologically disruptive) power from especially favourable sites, sometimes at competitive prices For fundamental physical reasons, however, they cannot provide more than about a hundredth of the power potentially available from conventional hydroelectric stations For this reason, and because of their special site requirements and relatively high capital cost, they are likely to remain of merely local interest.

Hydroelectricity

63. Hydroelectricity, the largest indirect source of solar energy currently used for generating power, could, in theory, be expanded more than 10 times to provide several times the total current world electrical capacity Such full use will not be approached in practice because

(*a*) The accumulation of silt renders most man-made reservoirs useless within a century or two (or even less), this problem may well be insoluble;

(*b*) As recent controversies have shown in the United States of America, where only about one fifth of theoretical capacity has been used, land-use conflicts can delay or prevent large hydroelectric developments,

(*c*) Near-saturation or even over-saturation of prime sites in most industrialized countries means that the great bulk of unused theoretical capacity is in poorer countries which are unable to build their own dams and sometimes unable to obtain enough foreign help without onerous conditions (Africa, South America and South-East Asia contain, respectively, 27, 20 and 16 per cent of the world's theoretical capacity),[109]

(*d*) Recent experience with large dams, especially in tropical countries, suggests that the geoghysical, ecological, epidemiological and social side-effects of such massive projects may make them a very bad bargain Smaller, more labour-intensive projects, and carefully integrated land-use planning, might significantly reduce such side-effects, but in the current state of knowledge it would be premature to reach wholly sanguine conclusions,

(*e*) Large water projects could have regional and even global climatic effects,[110] especially projects affecting the Arctic, e g, diversion of Siberian rivers Such effects cannot be accurately forecast with current knowledge, but are the cause of considerable concern A combination of constraints (*d*) and (*e*) probably makes most major projects (e g, Amazon, Mekong) inadvisable

It appears unlikely that installed world hydroelectric capacity will double during this century If it did, the increment would equal several per cent of current world energy conversion The dependence of many developing countries on their hydroelectric resources, however, does make it very important for them that the above-mentioned problems be vigorously attacked

Indirect solar collection

64 Solar energy can be collected indirectly by the following methods

(*a*) Agriculture, forestry, fish-farming, hunting, fishing and gathering, all of which are beyond the scope of this paper;

(*b*) Synthetic agricultural systems designed to produce fuel by photosynthesis This method looks less promising (for reasons of efficiency and ecological stability) than the use of natural productivity (general "biomass", or agricultural and human wastes) through direct combustion, distillation or fermentation Like combustion of urban solid wastes, these techniques, currently used locally on a small scale, could be quickly developed as a useful supplement to conventional energy sources in many regions Much more work is needed in this field,

(*c*) Windmills, which are of little use for centralized energy conversion, but can be very useful (where desired) in many rural areas. Their efficiency has greatly improved in recent years. The related problem of energy storage is briefly considered below;

[107] The uncertainty here is semantic, not technical The outward flux of geothermal heat is continuous, but a power scheme would deplete local stocks of heat far faster than they are replenished, thus, in effect, consuming temporarily a slowly renewable capital stock

[108] United States of America, Ninety-second Congress, Senate, Committee on Interior and Insular Affairs, *Summary Report of the Cornell Workshop on Energy and the Environment* (May 1972), R W Rex, "Geothermal energy, the neglected energy option", *Bulletin of the Atomic Scientists* vol 27, No 8 (October 1971), pp 52-56, United States of America, Ninety-second Congress, Senate, Committee on Interior and Insular Affairs, *Geothermal Resources and Research* (15 and 22 June 1972)

[109] M K. Hubbert *loc. cit*

[110] *Inadvertent Climate Modification*, *loc cit*

(*d*) Though harnessing of sea currents does not seem practicable, recent suggestions of operating heat engines from vertical temperature gradients in tropical oceans [111] may merit further study. Costs and side-effects are unknown; large-scale use in the next few decades seems rather unlikely. The technology could be explored through bottoming cycles in electricity generation.

Direct solar collection

65. The last possibility to be discussed is that of directly collecting the diffuse but enormous solar flux to generate high-temperature heat or electricity, for this is a major medium- and long-term option which, after decades of persistent but nominal effort, is just beginning to receive the attention it deserves. [112] (The recent Japanese commitment to major efforts in solar research and development is a straw in the wind.) Centralized conversion to electricity on a very large scale must, however, be distinguished [113] from diffuse conversion, e.g., in single-dwelling collectors that yield hot water and (through heat-pumps [114]) hot and cold air. The latter type of device is in use in many countries today, albeit in rudimentary form, and would probably be competitive with conventional methods in most temperate latitudes, if supported by modest development efforts. Indeed, there is good reason to believe [115] that diffuse solar technology may already be competitive with conventional methods anywhere in the United States or similar latitudes. There appears to be no fundamental reason why such domestic-utility technologies could not be widely proliferated within the next few decades, producing vast savings of fossil fuels. The barriers to this innovation appear to be entirely institutional. It is not generally realized that modern "selective black" surfaces—highly absorbent through the visible spectrum but poor radiators in the far infra-red—can attain very high working temperatures, even on a cloudy day. After all, the effective working temperature of the sun as an energy source is about 5,500°K—nearly the boiling point of tungsten.

66. Centralized photothermal or photo-electric conversion is a somewhat peculiar concept, since one of sunlight's greatest virtues is free distribution. Major engineering studies [116] of large centralized systems are still embryonic, but suggest that capital costs are likel to be within striking range of current sources, if reduce by research and development the objective of whic was to develop better materials. [117] Thin-film sand wiches and Fresnel-lens arrays look particularly in teresting. Low maintenance cost, low environmenta impact, free fuel and security of supply should weig heavily against any residual increment of capital cost It is argued that photothermal conversion requires a great deal of land, but, in fact, it requires less thar prolonged strip-mining of coal and can coexist witl certain other uses.

67. Solar power, in general, has several unique implications which do not arise from its obvious advantages (such as simplicity, guaranteed safety anc feasibility, sufficient magnitude, free fuel and low environmental impact). For example, it could help to redress the severe energy imbalance between temperate and tropical zones; its diffuseness is a spur to decentralization and increased self-sufficiency of population (highly desirable on other grounds); as the least sophisticated major energy technology, it could greatly reduce world tensions resulting from uneven distribution of fuels and from limited transfer of technology; and by limiting the density and the absolute amount of power at man's disposal, it would also limit the amount of ecological mischief he could do, without necessarily limiting his ability to live a comfortable and happy life. Lastly, the climatic impact of a direct or indirect solar economy would be minimal.

68. Not all proposed solar-energy schemes are terrestial: Glaser's proposal for large photo-electric collectors in synchronous orbit deserves mention. The economics of such a scheme are several orders of magnitude out of reach, though they may deserve re-examination several decades hence. The safety problems of transmitting the power to earth by means of focused microwave beams may be soluble. Possible military applications of such a microwave source may account for official interest in the scheme.

ENERGY SYSTEMS AND COMPONENTS

69. Completeness requires, but brevity does not permit, a detailed discussion of energy conversion, storage and distribution technologies, which may have more impact on energy supply than does the availability of primary fuels. A few short conclusions may give some of the flavour of recent work in this complex field:

(*a*) If approximately two thirds of the heat produced by primary fuel in the generation of electricity continues to be wasted, electrification should be strongly discouraged as inherently inefficient: indeed, most average efficiencies have fallen in the past few years. Correcting the scandalous waste of fairly high-temperature heat from power-stations, as with the district-heating schemes

[111] C. Zener, "Solar sea power", *Physics Today*, January 1973, pp. 48-53.

[112] A conservative round number for average insolation at temperate latitudes is 100 W per square metre.

[113] United States of America, House of Representatives, Committee on Science and Astronautics, *Solar Energy Research*, Staff report, Serial Z (December 1972).

[114] Properly engineered domestic heat-pumps would be very useful in any case.

[115] United States of America, House of Representatives, *Solar Energy Research, op. cit.*

[116] N. C. Ford and J. W. Kane, "Solar power", *Bulletin of the Atomic Scientists*, vol. 27, No. 8 (October 1971), pp. 27-31; A. B. Meinel and M. P. Meinel, "Is it time for a new look at solar energy?", *Bulletin of the Atomic Scientists*, vol. 27, No. 8 (October 1971), pp. 32-37; United States of America, Ninety-second Congress, House of Representatives, Committee on Science and Astronautics, *Briefings Before the Task Force on Energy*, by A. B. Meinel and M. P. Meinel. Serial U (6 March 1972), vol. III, pp. 32-52.

[117] United States of America, House of Representatives, *Solar Energy Research, op. cit.*

common in Sweden, could reduce this objection gradually over the next few decades [118] "Thermal pollution", in other words, could be put to good use, which would otherwise demand fresh primary energy Meanwhile, the United States electric industry plans to use one half of primary energy in 2000 (now one fourth), which would require two thirds of the total continental runoff [119] as cooling-water to take the "waste" heat,

(*b*) Magneto-hydrodynamics (MHD) now looks less promising than combined-cycle gas turbines as a way of improving electrical generating efficiency Early versions of the latter already are about as efficient as the best modern steam-raising plant and promise dramatic further improvement Cryogenic generators and transmission lines also hold much in store,

(*c*) Electricity can be stored more flexibly, efficiently and cheaply in underground compressed-air reservoirs than by hydroelectric pumping—which is already uneconomic compared with peaking gas turbines Battery technology continues to improve, but no real breakthrough is yet in sight Electricity is still probably the most expensive form of energy to transport in bulk,

(*d*) Recent experiences of electrical utilities strongly suggest that the economies of scale alleged for large central stations and components may be illusory Not only is component reliability subject to important diseconomies of scale, but the whole subject of centralized *versus* diffuse energy conversion needs fundamental restudy,

(*e*) Heat storage is not as difficult as is often supposed, especially on a small scale. Large-scale schemes for underground storage of hot water [120] may be a relatively easy answer and deserve study;

(*f*) Chemical energy storage—as refined petroleum products, natural gas in gaseous or liquid form, hydrogen, alcohols etc —is an immensely intricate subject linked with, e.g., transport engineering, fuel-cell technology and industrial chemistry. Research can probably make it possible to assess on paper the implications of the theoretically elegant and flexible hydrogen economy [121] and of the possible advantages of a safer, probably cheaper and more easily adopted methanol economy [122] Methanol is already cheaper in long-haul transport than LNG [123] and offers both a smooth route of transition from an oil to a hydrogen economy and a convenient way of storing hydrogen in, e g , vehicles—a carbon and an oxygen atom serve, in effect, as carriers for four hydrogen atoms,

(*g*) Microbiological and enzymatic methods of energy conversion, ranging from the Calvin/Tributsch photo-electric cell to astonishingly efficient methods of producing hydrogen and methanol from simple substrates and then reconverting these fuels into biological fuel cells, may produce many surprises in the coming decade [124]

70 Obviously, no "unconventional" energy technology, or combination of technologies, offers an instant panacea, and the utility of particular choices will depend upon local needs, which vary as widely as the range of fossil-fuel options One can, however, argue that any strategy of research and development should favour as diverse as possible a range of options Needs change, technological adventures fail and plans need constant revision, but in diversity lies safety The possible virtues of decentralized energy conversion need special stress they may include lower cost, greater flexibility, smaller strategic vulnerability, higher system efficiency, lower risk, greater resistance to monopoly, compatibility with a wider range of human settlement patterns and (depending upon the technology considered) greater self-sufficiency in a world of increasing interdependence and instability Energy independence is already becoming a major objective of public policy in those countries where indigenous resources (ranging from coal to low latitude) permit it, and current political events will surely speed the trend.

Energy conservation

71 Most of this paper has been concerned with *what an economist would call "energy sources"* rather than "energy uses" While trying to redress this imbalance in the short space remaining, one must not make the common error of supposing that "energy demand" is any less important than "energy supply" In the next few years, it will be learnt that however much energy people "demand", they cannot use it if it is not available. From now on the choice will rapidly become clearer. whether to reconcile demand with need, according to an orderly plan, or by panicky improvisation in the face of imminent shortages The countries most responsible for these shortages can reflect that were their people not using several times as much energy as they need, cheap energy supplies could be available to the rest of the world for some decades to come If energy use *per capita* in the United States of America were reduced to that of, say, France, the amount

[118] The importance of using 'waste" heat for heating or industrial processes can hardly be overemphasized The obstacles are less technical or economic than institutional To overcome these obstacles, it may sometimes be worth while to degrade high-temperature heat deliberately, in order to insert a stage of buffering between the power-station and the users

[119] S F Singer, "Environmental quality and the economics of cooling", in D A Berkowitz and A M Squires, *op cit*

[120] C F Meyer and D K Todd, "Conserving energy with heat storage cells", *Environmental Science Technology*, vol 7 (June 1973), p 512-516

[121] Several recent informal studies suggest that a hydrogen economy, properly designed, need not be unduly hazardous More work is needed

[122] T B Reed, "The methanol economy—a practical version of the hydrogen economy', Massachusetts Institute of Technology, Lincoln Laboratory, internal report (Lexington, Mass, undated); J [illegible]
Engineering, [illegible]

[123] B Dut [illegible]
haul', *Oil a* [illegible]

[124] C -G [illegible]
veyed such options

"saved" would suffice to give everyone else in the world nearly a fourth more energy than he now has.

72. A few simple examples, easily multiplied, will illustrate the scope for energy conservation in the industrialized countries:

(*a*) Most modern architecture is extremely energy-intensive, with absurdly high lighting levels, poor insulation, universal air-conditioning, electric heating, excessive volume, excessive use of such energy-intensive materials as cement and aluminium, and non-solar orientation. The modern attitude in this sector is perhaps best exemplified by the World Trade Center in New York, a single building wired for 80 MW; by office buildings where neither air-conditioners nor lights can be turned off (though if it gets too cold one can turn on the electric heater as well); by the way cities are heated with power-stations to run air-conditioners that make the cities hotter; and by the apparent inability of the Government of the United Kingdom (among others) to prescribe for houses the minimal standard of roof insulation required for piggeries (though heavier insulation still, as is common in Scandinavia, would pay for itself in a year or two and would be, perhaps, the most cost-effective way of helping the balance of payments of the United Kingdom);

(*b*) The extravagance of modern private transport and the poor deployment of public transport are too obvious to need much comment. Transport accounts directly for about 25 per cent of total energy conversion in the United States, almost twice as much as for space heating and cooling (transport in the United Kingdom is only a slightly smaller fraction). Institutional reforms are badly needed in such areas as motor-car insurance regulations and airline franchising (e.g., perhaps commercial aircraft could be shared in a common pool, just as railway freight-haulers in the United States share their rolling-stock). Using canals, and even such unconventional methods as containerized airships, could be worth while for intercity freight transport. Better communication, too, could help to move information rather than people, at far lower energy cost;

(*c*) The energy cost of non-recycled materials (about one seventh of the energy in the United States) and of intensive agriculture (especially in the use of protein feed-stocks) is unknown, but undoubtedly sensational. The direct energy cost [125] of 1 kg of protein in English milk is estimated to be equivalent to about 20 litres of petrol. Slesser [126] cites a Stanford Research Institute estimate that in the United States modern production of 1 kg of beef protein requires about 350 MJ, equivalent to about 12 kg of coal;

(*d*) Energy is substituted for political and moral, as well as for physical, resources. Preparations for war (the ultimate form of conspicuous consumption) account for several per cent of world energy conversion. The potential energy represented by current stockpiles of nuclear weapons would, were it food, feed everyone on earth for a decade. The potential energy represented by munitions detonated by the United States over South-East Asia in 1965-1971 is equivalent to the food input of some 2 million people over the same period.

Energy waste cannot be avoided nor rational energy policies devised unless the energy costs of each technology and of each material flow are known. The development of value-added energy accountancy is just beginning, [127] albeit in a haphazard and unco-ordinated form. Better information on where the enormous energy conversion goes and what is obtained for it, presented in sufficient detail that it will be possible to energy-budget, for example, fresh peas *versus* frozen peas, is likely to produce many surprises. It will encourage the evolution of a whole-systems approach that uses integrated design to match various forms of energy to the most appropriate uses and to minimize total conversion. This method is likely to be cheapest in the long run and to minimize ecological damage.

73. In this connexion, the intimate relationship of energy strategy to practically every other major area of policy must be stressed once more. The energy-intensiveness of modern agriculture has already been mentioned. Still more complex is the role of energy in human settlements. Modern urban agglomerations may have a power density so high, and so vulnerably expressed, as to be unsustainable in an era of limited and uncertain energy supplies. Plans for urbanization must take this into account.

Forecasting

74. Energy forecasting, currently in considerable ferment, needs to be rebuilt around causality rather than correlation, so that the validity of assumptions and the state of fundamental determinants of energy demand can be constantly reviewed. It is not yet known what these determinants are, nor what the price elasticity of demand might be for any particular form of energy, nor whether large price rises would have much effect on industrial economies as a whole (as opposed to, e.g., the private transport sector; fuel costs in the former have in the past been a small fraction of total costs). A mature science of energy forecasting would also include an institution to anticipate and identify, and to assess the energetic consequences of, changes in technology or in market patterns. [128] Rational regulation of undesirable trends is impossible unless potentially energy-intensive products or practices can be noticed early, before decision-making becomes politically painful.

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[125] G. Leach, personal communication.

[126] M. Slesser, "Energy analysis in policy making", *New Scientist*, vol. 60 (November 1973), pp. 328-330.

[127] It is not even known yet whether nuclear-fission technology, taking all inputs into account, is likely to be a net producer of energy.

[128] The "full-steam-ahead" scenario of the Ford Energy Policy Project has had to assume a modest saturation in energy demand in the United States of America by 2000: not because supply constraints were assumed, but because the Project staff could not devise plausible ways to use that much energy.

Doing more with less

75 Though there is a great deal to be learnt about the social role and the physical function of energy in various societies, enough is now known to be confident that energy demand in most highly industrialized countries is several times their actual need Action must be taken promptly to put this knowledge into practice In the United States of America, for example, a politically acceptable strategy could be devised and implemented within two years for an orderly reduction of the energy growth rate by perhaps 0.3-0 5 percentage points per annum, reaching zero within about a decade, despite continuing population growth The author believes that without prohibitive cost or disruption, the level of energy conversion in the United States could then be smoothly reduced, [129] at a rate of, perhaps, 1-2 per cent per annum, by a factor of at least two over the ensuing two or three decades—again despite continuing population growth It is unlikely that anyone who has seriously studied the scope for energy conservation and redeployment of economic activity in the United States will quarrel with this conclusion [130] Similar, though perhaps less drastic, economies are undoubtedly possible throughout the industrialized world and are often necessary on other grounds (e g , food supply) No world or national energy strategy can succeed without close attention to such measures.

76 In order to devise strategies for the orderly reduction of energy use *per capita* in the more industrially developed countries, one will need not only value-added energy accounts for goods and services, but, as a basis for policy decisions, detailed scenarios of alternative life-styles at varying levels of energy intensity Also needed will be detailed assessments of the social, ethical, political and humanistic implications of technical and strategic choices—more important, perhaps, to consider now than the technical and economic implications, which, though important, do not deserve to monopolize the attention of decision-makers. It will take many years of assiduous effort to develop all these tools; mankind cannot wait that long But though one does not yet know exactly what to do, one has a good idea of what not to do, and there is no need to wait for every last fact to come in before one stops doing it. Large public projects centred round the private motor-car offer an excellent example of resources that deserve a better fate

ENERGY ISSUES

77. So far, this paper has tried to give an overview more of the facts than of the issues in world energy It is time now to review and stress some important issues that must affect the choice of energy strategies

Distribution

78. First to be considered is the drastically skewed distribution of energy resources and of energy consumption Correcting the latter problem will require far more responsive and far-seeing management in the industrialized countries, ready to formulate deliberate strategies for energy conservation [131] before rationing and failures of supply enforce a haphazard and spartan self-sufficiency It will also require societies with quite different goals to learn from the mistakes into which an expanding economy of flow has led their materially richer, though not always happier, neighbours Furthermore, skewed energy distributions not only in space but in time, as subsidies are stolen from the future, [132] raise issues fundamental to the morality of modern industrial societies [133]

Risk

79. Next is the equally important issue of risk Rapid growth in energy conversion increases the magnitude and likelihood of mistakes It also appears recently to have come to depend upon the rapid development and deployment of technologies so complex and so novel that their side-effects may be unpredictable—or, more commonly, may be predicted but not taken properly into account in decision-making, owing to institutional momentum or to the distractions of a crisis atmosphere

80 It is instructive to study three outstanding examples of exceptional, and little-known, risks in new energy technologies

(a) Unirradiated or reprocessed fissile isotopes, with half-lives of 10,000 years or more, must be perpetually safeguarded against "diversion" (theft) by terrorist groups, non-nuclear Governments, lunatics, criminal syndicates or speculators A few kilogrammes of ^{233}U, ^{239}Pu or highly enriched ^{235}U—regardless of chemical

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[129] As simple calculations show, merely slowing the energy growth rate buys very little time (see C L. Wilson, *loc cit*) To make the problem soluble, the rate of change of energy conversion must be swung slightly negative Of course, reductions in *per capita* energy conversion could be "sold" to the public, not as cuts in the level of living, but as improvements in the quality of life

[130] Recent studies by the North Atlantic Treaty Organization and the United States Office of Emergency Preparedness envisage possible energy savings of the order of one seventh to one fifth by the early 1980s These rather conservative figures—which, incidentally, amount to a negative growth rate of several per cent per year—would be far larger if extended over a long enough period to reflect substantial changes in life styles, rather than merely cosmetic changes, or if one had the tools (value-added energy accounts and clearly stated alternative sets of social norms and goals) with which to do a more sophisticated and detailed calculation of possible savings Nobody has yet addressed such interesting questions as the energy budget of, say, the United States of America with a material standard similar to that of 1910, but with modern medicine communications and similar amenities

[131] H Perry, *op cit*

[132] As Hugh Nash remarks, what better way is there to show our faith in our descendents' boundless technological ingenuity than to make sure they need it?

[133] The problem of a sustainable energy economy is inseparable from that of a sustainable economy—an economy of stock in which growth is no longer used as a substitute for distribution (the "let them eat growth" principle) and in which moral growth is combined with a biophysical steady state H E Daly, *Toward a Steady-State Economy* (San Francisco, Calif , W H Freeman, 1973)

form—can be made into a crude, but wholly convincing nuclear weapon [134] by a physicist with a small group of dedicated technicians, a £10,000 model shop, less than a year and techniques thoroughly described in the open literature, [135] mainly in publications issued by principal public nuclear agencies and thus likely to be considered authoritative. Experience in fabricating strategic materials is available from thousands of people now in civilian life, but is not essential. Indeed, actual manufacture of a weapon is optional if a credible threat of having done so can be manufactured instead.[136] Reactor-grade, rather than weapons-grade, plutonium is suited for sophisticated amateur weapon-makers if an unpredictable, but large, yield is sufficient. [137] Recycling of ^{239}Pu will extend safeguards problems to most thermal reactors: a 1-GW (e) light-water reactor makes several hundred kilogrammes of ^{239}Pu a year. Highly enriched uranium fuel, however, such as that of high-temperature gas-cooled reactors, is easier to fabricate, though less reactive. A home-made weapon which failed to achieve instant criticality and high yield could still do immense damage—and, in disassembling, disseminate ^{239}Pu and the like. Extensive, mainly secret, and certainly inadequate, measures are now taken to prevent theft of strategic material. The safeguards systems literature shows that continual small thefts from fuel facilities are, in principle, undetectable; that it may take weeks or months to detect large single thefts; and that the precision of inventory assay, though improving, is likely to remain inadequate to detect small sporadic thefts. Moreover, since safeguards techniques concentrate on where strategic material is supposed to be, rather than on where it is not supposed to be, it is hard to tell where stolen material has gone. Recovery presents extreme difficulties, especially after a theft from the vulnerable transport network [138] (tens or hundreds of shipments daily in a mature ^{239}Pu economy). Safeguards more costly and thorough than those now applied to fissile isotopes have failed to halt aircraft hijackings, bank robberies and the black market in heroin (whose black-market price is comparable to the open-market price of ^{239}Pu; nobody knows, one hopes, what ^{239}Pu might cost in a demand-stimulated black market). Such analogies suggest, and the technical literature tends to confirm, that it is impossible to prevent the theft of strategic material by sufficiently determined groups whose motives "are subversive or economic"; [139]

(*b*) The marine carriage of liquefied natural gas (LNG) is now in its infancy, but has a current doubling-time of under two years. [140] Receiving terminals for large and highly sophisticated LNG tankers are planned or are being built in urban and semi-urban harbours.[141] LNG is essentially liquid methane (CH_4), carried at about −165°C. If spilled on water, it boils extremely quickly, forming a cloud of methane gas which, by reason of its extreme cold, is denser than air and forms a ground-level cloud or plume. Such a plume—which might, in the case of a large tanker spill, extend at least 5 km downwind within 10-20 minutes [142]—is asphyxiating. It is readily ignitable, and will burn to completion in a turbulent diffusion flame reminiscent of the Hindenberg disaster in 1937 (but 100 times as large). Spillage of LNG after a collision or hard grounding (or, conceivably, after sabotage of a tanker or terminal) would be promoted by brittle fracture [143] of metal structures, such as hulls, on impact of the cryogenic cargo; experience of such incidents suggests that plate failure could propagate and cause an LNG carrier to unzip like a banana. The energy content of a single LNG carrier of 125,000 m^3 (the standard size now being built) is equivalent to approximately 55 Hiroshima bombs;

(*c*) A recent paper [144] plausibly suggests that a large spill of oil in the Beaufort Sea is physically capable of reducing the albedo (reflectivity) of large areas of the Arctic pack ice. The oil could emulsify into small,

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[134] The suitability of an isotope for weapons depends on, *inter alia*, the ratio of its fast-neutron fission cross-section to its non-fission capture cross-section. This ratio is rather favourable for some isotopes which are not fissile in the usual sense, *viz.* fissionable by slow neutrons. Study of the published cross-sections at the appropriate energies shows that a fast critical assembly can be made from reasonable quantities of certain isotopes which are not fissile, and some of which are not now safeguarded. The present discussion therefore refers to "strategic material", not just to the three fissile isotopes named or to "special nuclear material" as defined by regulations of the United States Atomic Energy Commission.

[135] D. P. Geesaman, "Plutonium diversion", presented at the California Legislature's Assembly Science and Technology Council's Energy Panel on Radiological Issues Related to Nuclear Power Plants, 15 June 1972.

[136] R. E. Lapp, "The ultimate blackmail", *New York Times Magazine*, 4 February 1973.

[137] V. Gilinsky, "Bombs and electricity", *Environment*, vol. 14, No. 7 (September 1972), pp. 10-17.

[138] The recent decision of the United States Atomic Energy Commission that substantial shipments will be accompanied by armed guards will presumably make shipments more conspicuous. It is doubtful that such measures will deter any but the casually curious.

[139] The masterly survey of the safeguards problem compiled by Taylor and Willrich for the Ford Energy Policy Project (January 1974) is strongly recommended. Its logic leads one to surmise that the steps for transition to a fission-free economy should include consumption of all transuranic stocks in low power density, remotely sited and diligently guarded reactors. See also D. P. Geesaman, *loc. cit.*

[140] E. Faridany, "LNG marine operations and market prospects for liquefied natural gas 1972-1990", QER special No. 12, Economist Intelligence Unit, London, 1972.

[141] J. A. Fay and J. J. MacKenzie, "Cold cargo", *Environment*, vol. 14, No. 9 (November 1972), pp. 21-22.

[142] Lt. Cmdr. H. D. Williams, *Proceedings of the Marine Safety Council*, vol. 28, No. 9 (September 1971), p. 162; see also vol. 29, No. 10 (October 1972), p. 203. The similar estimates given by J. A. Fay and J. J. MacKenzie, *loc. cit.*, have a somewhat firmer theoretical base and are undoubtedly conservative. Naturally, nobody has yet tried a full-scale experiment.

[143] W. du B. Thomas and A. H. Schwendtner, "LNG carriers: the current state of the art", *Transactions of the Society of Naval Architects and Marine Engineers*, vol. 79 (1971), p. 440; R. J. C. Dobson, "Problems in the design and construction of liquefied gas carriers", paper 7, LNG/LPG Conference, London, 21-22 March 1972, *Shipbuilding and Shipping Record*.

[144] W. J. Campbell and S. Martin, "Oil and ice in the Arctic Ocean: possible large-scale interactions", *Science*, vol. 181 (6 July 1973), pp. 56-58.

highly persistent droplets which, circulated in the currents, would collect on the underside of the pack ice. Seasonal melting on top and freezing on the bottom would then yield a darkened ice surface in a few years It is known [145] that the Arctic pack ice is in an extremely delicate state and could be quickly melted by certain types of small perturbations, with profound and irreversible effects on world climate A small reduction in ice albedo, especially during April and May, could promote melting very effectively [146]

81 Risks of this magnitude—all uninsured and uninsurable—clearly deserve a more earnest public debate than they have received Risk (*a*) is the subject of intense professional worry and vague public unease, risk (*b*) has stimulated a small, comparatively obscure literature and a tendency for the responsible agencies to look the other way, [147] and risk (*c*) is virtually unknown except to a handful of climatologists, who are taking it very seriously It is worth noting further that all three of these risks are acute, not chronic nobody knows the cumulative long-term effects of modern energy technologies on, e g, human health, genetic resources or the stability of ecosystems. Interference with natural energy flows by means of intensive agriculture offers a particularly worrying example Indeed, it is hard to think of any current energy technology in extensive use that does not hold the potential for serious long-term environmental risks—risks which today may be wholly unsuspected.

Ethics

82. The strong ethical ingredient of future-risk problems is perhaps most clearly seen in the perennial controversy, apparently as far from resolution as ever, over the rather arbitrary standards for human exposure to ionizing radiation Critics of these standards argue, rightly, that safety has not been proved Advocates reply, correctly, but perhaps immorally, that harm has not been proved Critics point to disquieting statistical trends—inconclusive but suggestive—and say that the burden of proof should rest on the innovator, as is theoretically the case with even the most beneficial drugs. Advocates can take comfort in the difficulty of demonstrating any real low-level effects, because of the lack of controls in large populations and the lack of statistical significance of small long-term effects in small populations Meanwhile, while several thousand million people are being asked to sign by proxy an irrevocable Faustian bargain, [148] whose small print they have not read and are told they cannot understand, those perhaps most affected—thousands of generations yet unborn—are not consulted at all As Kneese stresses, [149] this sort of ethical issue is beyond technical scope or competence, is too important to be left to experts and requires instead to be resolved explicity in the most open forums of society This procedure will be slow and hard, but it is scarcely a dispensable luxury

Conflict

83 Issues as complex, but of a mixed ethical and pragmatic character, are raised by the enormous conflict potential of inequities in the distribution of world fuel resources The inherent delicacy of politics in the Middle East, the likelihood of massive armaments purchases there, the prospect of increased energy competition between the United States and other countries of the Organisation for Economic Co-operation and Development (OECD) and the growing importance of such commodities as gas from Siberia, tar-sands from Canada and enriched uranium from the United States need no emphasis The divergent interests now tugging at physical resources, too, will become more and more concerned with intangible resources, with technology, as the countries best able to afford difficult research monopolize the results to their own advantage and ignore or exploit the technological dependence of others Such advances as would most benefit the poorer countries, however, they will probably have to make for themselves as best they can, since the technically advanced countries are, for the most part, too busy with their own problems to consider the workings of an energy-conserving, labour-intensive, decentralized society

Outer limits

84 Lastly, the ultimate constraints—local, regional and global—on human energy conversion raise important medium- and long-term issues that would defy resolution by existing institutions Not considered here are the possible outer limits that have yet to be even roughly quantified, for example, those imposed by the availability of land or of capital (about £5 × 10^{11}, perhaps £ 10^{12}, needed for the world oil industry alone by the mid-1980s) or by the biological implications of much by-products as transuranic isotopes or sulphur compounds The discussion here is concentrated upon climatic limits, where the current state of knowledge is as follows

85. Man-made particulates, some from combustion, already form a substantial fraction of the atmospheric load. Combustion (except of hydrogen) also causes an upward trend, averaging 0 2 per cent per annum in the atmospheric concentration of carbon dioxide. These two effects are, in some respects, competitive in their effects on global climate, but may, in other, and perhaps more important, respects be co-operative, tending to reinforce the effects of man-made heat. They may become important in the first half of the next century. Some

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major groups of insurance underwriters are also becoming wary of large LNG tankers and terminals

[148] A M Weinberg, "Social institutions and nuclear energy", *loc. cit*

[149] A V Kneese, *loc cit*

scientists [150] suspect they may already be significant on a regional scale.

86. The influence of man-made heat—the end-product [151] of any energy conversion, regardless of the technology used—is already great locally and will, soon, become significant regionally. Most large industrial areas, including several with areas of about 10^{10} m^2, already add on the order of 10 per cent of net solar heat input to the surface; such areas are projected to intensify, multiply, spread and merge. The distribution of such regional "heat islands" will be very uneven and mainly at high northern latitudes. The man-made power density of Manhattan Island in New York City (over 700 W per square metre from man, compared with 93 net from the sun) is very exceptional, [152] but perhaps illustrates what can be done.

87. Global climate is capable of rapid transitions between very different states. These transitions can be triggered by relatively small perturbations applied at particularly sensitive leverage points, such as the floating Arctic pack ice. [153] Man-made heat might well be able to provide such a perturbation, at current growth rates, in the first half of the next century, and could certainly do so shortly thereafter. [154] An immense amount of intricate research must be done to determine when such a threat might arise, since it must not be studied empirically. Such research might not yield a definite answer. Though from current, very limited, knowledge it appears that the current pattern of energy growth is probably safe for a few more decades, alternative long-term strategies not involving energy-intensive technologies must be developed promptly in case, as is plausible, global thermal limits make it inadvisable to seek an energy increase of factors of 10. Any long-range commitment now to an order-of-magnitude energy increase is definitely premature. [155]

88. Regional climate is capable of periods of prolonged aberration from the mean, such as repeated seasons of drought or storm. Such fluctuations have profound effects on social and economic systems, especially in the current precarious state of world food supplies. There is as yet no firm evidence to implicate in, or to exonerate from, regional climatic disturbances possible man-made perturbations. [156] Urgent research into this question, and into the influence of climatic change on man's activities, is now beginning.

89. The many unresolved questions about basic climatic mechanisms make present rapid energy growth-rates disquieting and suggest to many climatologists that a policy of caution should be adopted without delay. These doubts imply, also, that world energy problems cannot be realistically treated as a sum of national problems in a strongly interactive and non-linear world. International institutions able to regulate man's influence on climate may become essential soon, especially in view of major water and deforestation proposals currently under study.

Conclusions

90. This paper has only scratched the surface of a body of problems whose detailed exposition would be the work of many lifetimes; yet even at this level of detail, the information density has been so high that it would be quite wrong to attempt a summary. It may be useful to present, instead, certain inferences which the author believes could properly be drawn from the foregoing assessments. To sharpen the focus, the number of such conclusions has been arbitrarily limited to 10:

(1) The rapid energy growth-rates that most industrial countries have long maintained cannot continue for much longer. Governments should adjust to this reality and devise long-range strategies consistent with it, and with the other resource constraints that it entails. Even the ability to maintain current levels or energy conversion *per capita* in many more industrially developed countries over the next few decades is in doubt;

(2) Industrial countries should immediately undertake lasting and fundamental (not temporary and cosmetic) measures to conserve energy in all sectors and forms, and particularly to minimize the consumption of oil and natural gas. The methods that have so effectively promoted these forms of consumption must now be put into reverse;

(3) Means of minimizing the social and environmental costs of mining and burning coal are urgently needed, as coal and its synthetic products offer many countries their only short- and medium-term bridge from a petroleum economy to a sustainable energy economy. The problems of coal are substantial but can be solved; [157]

(4) A diverse range of "unconventional" energy technologies, especially those based on energy income rather than on energy capital, should be developed and deployed as quickly as possible, with the help of suitable incentives. Both new and current energy technologies should be integrated into systems that use each form of energy as appropriately and efficiently as possible;

[150] R. A. Bryson, "Drought in Sahelia: who or what is to blame?", *Ecologist*, vol. 3, No. 10 (October 1973), pp. 366-371.

[151] The reference here is not to local "thermal pollution"—the discharge, often ecologically important, of "waste" heat from a power cycle—but to the requirement of the second law of thermodynamics, that all energy end as low-temperature heat, no matter for what purpose or by what means it is converted.

[152] *Inadvertent Climate Modification, op. cit.*

[153] *Ibid.*

[154] See the two articles by A. B. Lovins, "World energy strategies", *Bulletin of the Atomic Scientists*, vol. 30, No. 5 (May 1974), pp. 14-32; and, "World energy strategies, part 2: the case for long-term planning", *Bulletin of the Atomic Scientists*, vol. 30, No. 6 (June 1974), pp. 38-50.

[155] *Ibid.*

[156] R. A. Bryson, *loc. cit.*

[157] One might make a reservation about the sub-micron particle problem (see foot-note 46); but presumably that can be evaded through coal conversion to synthetics.

(5) The fiscal and human resources now devoted to nuclear fission programmes, and particularly to fast-breeder reactor development, should be directed forthwith to aims (2)–(4) Governments should suspend their nuclear programmes until enough infallible people can be found to operate them for the next few hundred thousand years; [158]

(6) All oil and gas resources should be carefully husbanded—i e, extracted as late and as slowly as possible The descendents of this generation will be grateful;

(7) Governments and their constituencies in the highly industrialized countries should begin to contemplate seriously and to decide upon the changes in life-styles that energy and other constraints will soon impose—changes that may well be desirable on other grounds, [159]

(8) *The energy technologies most appropriate to the* poorer countries are also likely to be those on which the richer countries will mainly rely in the long run These technologies should therefore be developed and transferred (with careful attention to the corresponding need for social and institutional transfer, which may have undesirable side-effects) as soon as possible, even though that may mean advancing the development schedule that the rich countries' own needs would dictate. World trade patterns should then be realigned to take account of the redistribution of energy Interim means should be urgently sought to assist those developing countries whose importation of energy-intensive technologies (especially in agriculture) has made them dependent upon energy which, due to others' extravagance, they can no longer afford,

(9) Countries not yet industrialized should make every effort to avoid others' mistakes by (in general) minimizing their populations, maximizing their agricultural self-sufficiency (particularly in the use of sustainable, labour-intensive methods) and minimizing their need for large amounts of industrial energy. The rapid introduction of diffuse and medium-scale solar power should help, especially in tropical countries, to reduce urbanization by improving rural economies and living conditions. It is impossible to bring world energy conversion *per capita* up to the levels of rich countries, on the contrary, the latter levels should be considerably reduced as an essential part of redistribution;

(10) All countries should take note of the following points of policy.

(*a*) Economic processes are often assumed to have limited materials inputs, unlimited energy inputs and market-limited outputs. Boundary conditions on the energy inputs are now needed [160] In short, physical law imposes limits on technology, and physical, as well as economic, factors must govern energy,

(*b*) A science of energy impact analysis must be devised so that energy can be made a critical variable in all policy decisions, rather than leaving it to emerge *de facto* from decisions taken on other grounds;

(*c*) Need must be distinguished from demand and needless demand must be curbed Rates of energy growth must be reduced or reversed in industrial societies before it is done for those societies by the consequences of current rapid growth, [161]

(*d*) In order to make rational long-term decisions, longer than about 20 years, [162] man must learn about the non-linear behaviour of biological systems, rely less on discounted cash-flow planning, stop discounting future risks, greatly lengthen man's time horizons, rely on economic sensitivity analysis rather than on marginal-cost analysis and anticipate socio-technical lags by sophisticated and diverse strategies of research and development Slower, or negative, energy growth, properly used, can buy the time needed to do these things,

(*e*) Man must adopt explicitly the methodology of decision-making under uncertainty, recognizing that even events of extremely low probability may occur and must be guarded against;

(*f*) Lastly, one must keep more clearly in mind the *ways in which the time-scale selected for planning can* effect the choice of strategies Pursuing a short-term goal (such as independence from imported oil) can foreclose long-term options, just as some countries are restricted now by short-term planning in the past Planning is a process of formal procrastination, and its aim in an uncertain world must be to keep as many options open as possible. Current energy policies, however tacit and ill-constructed they may be, are quickly destroying the options that mankind, living and unborn, will need for millenia

[158] It may be argued that man cannot do without fission, but (*a*) man is in effect doing without it now, (*b*) there are at least two long-lived major technologies—coal and solar technologies—that are known will work and that have no problems remotely comparable to the safety, waste and safeguards problems of fission, and (*c*) if man really cannot do without fission, then—assuming the current engineering problems with it to be overcome—all long-term planning becomes academic

[159] Many, perhaps most, of these changes could be for the better None the less, very careful planning will be needed to minimize discontinuities The transition to a sustainable energy economy has much in common with a transition to a macro-stable, micro-variable economy of stock that prefers services to material consumption In both cases, stabilization or reduction of population size and local self-sufficiency in food production must be top priorities (See H E Daly, *op cit*)

[160] This is so if only because the capacity of a given volume of space-time safely to accept heat is a strictly non-renewable and non-substitutable resource (a concept foreign to most economists)

[161] A system with rapid rates of change compared with built-in delays is inherently unstable The instability can be reduced by reducing the rates of change, or by reducing those delays that are due to social rather than to natural causes (for example, by autocracy), or by accurate long-range predictive planning methods that do not now exist The world appears to a system in this state

[162] As Maurice Strong points out, currently used discount rates imply that the current value of a child is essentially zero

ENVIRONMENTAL PROBLEMS OF THE DEVELOPED COUNTRIES *

Joseph L. Fisher **

1. Environmental problems have been increasing in severity quite rapidly in most parts of the world, especially in the more developed countries and regions. Air pollution in cities has mounted as more and more people have crowded in looking for employment. Water pollution, again especially in urban regions, has increased with the growth of industry as well as of population. Congestion has become worse in housing and on streets. Noise has become more bothersome as the numbers of motor vehicles, industrial operations and building construction have increased. The disposal of solid waste from industrial, commercial and household sources has become a major concern of city managers and administrators. A few pollutants, such as certain chemicals and toxic metals, and, of course, radio-active materials, have tended to spread widely through the atmospheric and ocean systems of the world, while general increases in heat discharges and carbon dioxide may be exerting slight though profound effects on hemispheric climate. Individual and social amenities associated with a clean, uncluttered and orderly environment have been lost. Wilderness and wildlife have been endangered. Parks and open spaces in cities are inadequate to meet needs. Land planning, river-basin planning, air-shed planning—environmental planning in general—have been inadequate. Most of these conditions arose earlier in the more developed countries than in the less developed ones, and came on faster. [1]

2. Environmental problems can be classified in various ways: by type of pollutant; by cause or source of the problems, such as population growth, industrialization, behaviour of consumers or mode of technology; by effects on health, income or social welfare; by geographical areas; and by policies or measures for dealing with the problems. The purpose one has in mind should govern the classification system chosen. In this paper environmental problems are described under conventional headings of air, water, land, congestion, amenities and toxic materials. The more developed countries exhibit all these types of pollution in relatively high degree. Following this brief description, the major demographic, economic, technological, social and behavioural sources of environmental disruption are delineated, and the principal consequences are then characterized in terms of economic, health, social welfare, and amenity and aesthetic factors. Because environmental conditions vary greatly within developed countries, as well as among them, some attention is given to regional differences which now exist and, no doubt, will continue to exist. Lastly, alternative policies and programmes of action designed to deal with the problems are considered. Some of these are national in scope, some intra-national and some international. Special issues arising between the more and the less developed countries also are considered.

Environmental problems of air, water and land

3. In most respects, air quality in the urban regions of developed countries has been deteriorating for a long time, certainly since the onset of industrialization. Both ancient and mediaeval cities stank because of primitive sewerage facilities, but air pollution in the modern sense hardly existed. The so-called "industrial revolution", beginning in the late eighteenth century in England and then spreading to western Europe and north-eastern United States of America, was fuelled primarily by soft coal, which was burnt inefficiently yielding much soot and sulphur, and other compounds. A new and disagreeable kind of pollution was thus added to urban living in such cities as London, Birmingham, Paris, Brussels, Essen and the Ruhr Valley in general, New York, Philadelphia and, later, Pittsburgh. This kind of plague has now spread to Tokyo, Buenos Aires, Mexico City and wherever the advantages of industrialization have outrun the means and the will to control the harmful consequences. During the more recent decades, beginning in the United States after the First World War, then in western Europe and Japan after the Second World War, the rapid multiplication of motor-cars, trucks and omnibuses has added a new dimension to the urban air pollution problem. Combined with traffic congestion during the morning and late afternoon commuting hours, the hydrocarbons and other noxious chemicals discharged by motor vehicles have resulted in air pollution levels that endanger health. The operation of coal- and oil-burning electric power-plants within metropolitan areas has further exacerbated the condi-

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[1] In the category of more developed countries are included the countries of Europe, Northern America (Canada and the United States of America), Oceania (Australia and New Zealand) and Japan.

tion of the atmosphere. The total effect of these and other forms of air pollution can be cumulative over extended periods in certain topographical and meteorological situations, the prototypes of which are the Los Angeles basin, the Tokyo metropolitan region, and the coal-burning industrial areas of Europe

4 Water pollution has been a public health problem since the beginning of recorded history. Prior to modern times, the lack of biochemical and medical knowledge barred the way to effective treatment of both water-supplies and sewage; the basis and motivation for sanitary engineering were lacking Scientific and technological advances made during the past century or so have largely overcome this barrier, so that most cities and towns in the more developed countries now provide potable water. This is not yet the case in either the teeming cities or the rural villages of the developing countries Water purity standards are generally adequate in Europe, northern America, Japan, Oceania and other more developed areas, and treatment techniques are well established with only a few difficulties and uncertainties remaining, such as controlling certain virus strains and, of course, coping with new kinds of water pollution engendered by new industrial processes and products Despite a longer record of successful handling of water pollution than of air pollution, the developed countries are still confronted by serious problems of water pollution. Sophisticated industries require a wide range of chemicals and metals, which are discharged into streams, lakes and oceans Modern agriculture makes effective use of chemical fertilizers and pesticides, which also find their way into watercourses, especially when they are not applied properly to the soil Population growth, now almost entirely in urban regions, adds both to pure water requirements and to the generation of sewage and waste products In many places, sanitary and storm drainage systems are not separated, so that during rain storms sewage bypasses treatment plants and discharges directly into streams and other water bodies Lastly, people in more developed countries are less and less willing to tolerate polluted and deteriorated conditions in rivers, lakes and bays, largely because of their desire for outdoor recreation, such as swimming, boating and sport fishing. As with air pollution, modern economically advanced societies, while pursuing activities that result in more pollution of water, also demand higher standards of water quality With greater confidence in technology and larger financial resources, expectations about environment quality have outrun performance, and conditions appear to be even worse than they are or used to be.

5 Pollution of the land itself takes many forms, from chemical contamination to physical disfigurement and aesthetic degradation Along with water bodies, land is the ultimate sink in which pollutants come more or less to rest In more developed countries, the collection, processing and disposal of solid waste, that is, paper products, discarded metals, glass and plastic materials, have become major public service responsibilities In urban areas, even a short interruption of this service can hardly be tolerated The earlier practice of dumping raw waste on any convenient plot of ground has given way, in most such areas, to rather elaborate and systematic handling of solid waste, with increasing attention to public health, cost effectiveness and landscape restoration. Sanitary landfill sites now are reconstituted as parks, golf courses and even housing developments, all of which open up fascinating prospects for future archaeologists. To some extent, solid waste can be converted into air pollution by burning and into water pollution by dissolving or by direct discharge into water bodies Burned paper and other materials going up smoke-stacks can be reconverted into solids by means of precipitators, but these solids have to be dumped on land or in the water A whole complicated series of trade-offs arises calling for systematic analyses and decisions Solid-waste management schemes that are efficient from the technical and economic standpoints frequently prove unacceptable in political and behavioural terms These latter factors constrain severely the management programmes that ultimately will be workable, as public officials have discovered repeatedly As with air and water pollution, regional approaches to solid-waste handling usually will be preferable to trying to cope with the problems on a smaller scale.

6 Yet another kind of pollution has more recently come to prominence as a result of modern agricultural and industrial technology Inorganic fertilizers—nitrogen, phosphates and potash—have been applied in larger and larger quantities to farm land, especially in the more developed countries The same is true of a bewildering variety of chemical pesticides, insecticides and herbicides A number of trace metallic elements have found increasing application in agriculture to restore adequate amounts in the soil Many of these substances contaminate surface- and ground-water supplies, and some of them are carried through the air later to settle on distant land and water In large enough doses, they may be injurious to human health or to animals, birds and fish The fertilizer materials, particularly when carelessly applied to crops, may accumulate in lakes and estuaries causing algae blooms detrimental both to industrial process and to human consumption uses of water, as well as to fishing and outdoor recreation

7. With the advent of nuclear power and weapons, a certain amount of radio-active substances has found its way into the atmosphere and watercourses Although damages thus far appear to have been minimal (Hiroshima and Nagasaki apart), the number of nuclear power-plants likely to be in operation in the more developed countries within the next two or three decades poses environmental and health problems of the utmost severity Even the enforcement of the strictest standards in fuel production and plant operation, and in the transportation, processing and disposal of radi e

waste cannot provide complete protection against the escape of radio-active materials of very long half-life that are associated with both conventional and breeder fission-type reactors.

8. Lastly, attention should be called to oil spills, deliberate or accidental, which have now reached the magnitude of a threat to the quality of the oceans and shorelines of the world. This threat is concentrated in harbours and bays where oil is shipped and in the straits and passages through which tankers ply. Other more toxic materials, such as mercury compounds or possibly carcinogenic substances associated with tailings from taconite mining, are occasionally discharged into water bodies.

9. Another set of environmental problems, occurring principally in the more developed countries, has to do with the deterioration of certain amenities of living—enough space and a lack of congestion, adequate parks and nature preserves, a minimum of noise and objectionable odours, a sense of orderliness and visual delight in both towns and countryside. As incomes continue to rise in Europe, Japan, Northern America and the few other more developed regions, increasing numbers of people are placing a high value on the aesthetics of environmental form and function and on the harmonizing of human activities with nature. In reaction to the excesses of urban, technological living, many persons, especially youth, have turned to a search for life-styles which emphasize slower rates of growth and change, simpler forms of behaviour, serenity of spirit and wholeness of personality. Back-to-nature movements, whether inspired by Rousseau or Thoreau, have invariably lacked staying-power and have soon died out in practice, although their intellectual and emotional influence continues to be felt. More hopeful of success would be a social movement directed towards incorporating, in muted degree, elements of the new life-styles with the inevitable complexity and fast pace of the Western type of industrialized society, so as to achieve a more humanized and sustainable future. Much will hinge on better planning and design for such a future and on the social discipline and control needed to bring it about.

Sources and consequences of pollution

10. The sources of environmental pollution in the more economically advanced countries are not hard to locate, nor are the larger and more immediate consequences. The delayed consequences, for example, of air pollution on health, are more subtle and difficult to gauge. The first and obvious pollution source is the growing population, which in various more developed countries has increased by anywhere from one fourth to more than double during the past three decades. To be sure, since the post-war "baby boom", fertility rates in most such countries have been falling and now are generally close to a net reproduction rate of one, signifying a long-run tendency for the population merely to reproduce itself. Absolute numbers, however, will continue to increase even if the unity reproduction rate is sustained—for as long as 70 years in the United States of America, for example—as the bulge in the age structure of the population now in the childbearing years works itself out. Clearly, if *per capita* amounts of pollutants and wastes were to remain constant, the residue loading of the environment would rise precisely with population. Within limits this is acceptable, given the capacity of air, land and water to absorb, dilute, carry away and otherwise render pollutants harmless; but in many places these limits are being approached or have been exceeded.

11. In many respects, more significant than the total number of persons is their distribution over the land. Counting all the more developed countries of the world, one finds that on the order of two thirds of their population is urban. For the United Kingdom of Great Britain and Northern Ireland, and for Sweden, the percentage approaches 80; for Japan and the United States, it is about 70; for the Union of Soviet Socialist Republics and Poland, more than 50; and for Australia, well over 80. Pollution and environmental degradation generally are worse in urban areas, which continue to grow more rapidly in population than countries as a whole. In the United States especially, but also in other more developed countries, urban growth is taking place mainly in the suburban rings, not in the central cities. However, air and water pollution and solid-waste disposal tend to be regional in scope, so that this intra-metropolitan pattern of movement and growth does not significantly reduce most kinds of environmental damage. In certain respects, the problems are intensified; for example, sewage collection systems, or, alternatively, individual septic tanks, are considerably more expensive in the more sparsely populated suburbs than in central cities, as is the collection of solid waste. Obviously, congestion and sheer crowdedness is greater in urban areas giving rise to numerous environmental and social problems. Yet, with good city planning and enough funds to provide preventive and corrective measures to maintain a healthful and attractive environment, plus the will and discipline to do these things, it should be possible to sustain an acceptable urban existence for even a few more people. This could be achieved by a further modest growth of cities and metropolitan regions already quite large, by the encouragement of greater growth in medium and even small cities, and by the establishment of a number of carefully located new towns.

12. Although the matter is under dispute, it would appear that the level of production and consumption, plus the kind of technology and products involved, are the principal sources of pollution and environmental disruption. *Per capita* national production and income correlate quite well with various indicators of pollution, such as energy use (particularly coal and petroleum), pesticides and commercial fertilizers, paper and paper products, production of chemicals, iron and steel and synthetic products in general. Furthermore, the more

developed the economy of a country becomes, the more rapid is the annual growth rate for the more polluting products, including plastics, motor fuel, glass bottles and synthetic organic chemicals. Industry tends to be concentrated in the same places as population and consumption, thus intensifying environmental problems in urban areas, such as the Ruhr region of the Federal Republic of Germany, the Midlands of England, the industrial area of south-western Poland, the north-eastern megalopolis of the United States and the Tokyo-Osaka region.

13 The two general indicators of pollution sources, or latent environmental degration, therefore, are population density, especially urban population, and *per capita* gross national product (GNP), which is generally a result of industrialization As a country or region moves towards higher levels in these two respects, it is increasingly likely to undergo environmental deterioration, that is, air and water pollution, solid-waste disposal problems, crowding etc, unless countervailing measures are taken to prevent or abate these harmful effects on the environment.

14. The table given below shows some of the indicators of pressures on the natural environment for a wide cross-section of developed and developing countries, and for all the developed countries and all the developing countries taken together (excluding those with centrally planned economies) Data for developing countries are included primarily to bring out the contrast between them and the developed countries with respect to environmental factors In the first set of columns are population density, urbanization and gross national product Population density and GNP are calculated in relation to agricultural areas, as well as to total area of each country, in order to show pressures on land that is more intensively used. Mere surface area has limited relevance to either production or pollution problems, especially for such countries as Australia, Brazil and Egypt. It can be seen that, contrary to much conventional thinking, there is little if any correlation between population density and levels of income Although incomes are low in densely populated countries like India and the Philippines, equally low incomes are found in countries with low population densities, such as Brazil or Zaire. Moreover, some of the highest income levels are in the countries with the greatest population densities, such as Japan and the Netherlands. Two columns of the table show that there is no over-all significant relationship between the level of income and the availability of land There are, however, wide differences in urbanization and in output *per capita* and per hectare between the developed and developing countries These differences account for significantly different burdens on the natural environment As figure I[2] shows, urbanization and high incomes are positively correlated. Both move up together, causing pollution problems to rise at a far greater speed than urbanization alone Excluding a few anomalies, such as Israel, Kuwait and perhaps Ireland and Greece, all of the more developed countries have more than half of their total population in urban areas and a *per capita* GNP of more than $800

15 The last four columns of the table show some indicators of particular types of pollution fuel consumption as the principal source of air pollution; paper and board consumption as an indicator of solid-waste problems, and fertilizer and insecticide use as an indication of land and water pollution arising from agriculture and health measures Other indicators that might be used include wastes discharged into streams and lakes, scrap-metal output and sulphur and other pollutants discharged into the air Each of these specific indicators of pollution, as well as many others, is more or less closely associated with the two general indicators, population density and *per capita* production

16 In figure II the relationship between *per capita* GNP and *per capita* energy consumption is shown The correlation is rather high, and the regression line is steep, showing that *per capita* energy consumption rises about fiftyfold for a tenfold increase in *per capita* GNP Figure III shows a similar relationship between GNP and paper usage Similar diagrams could be drawn, relating other specific measures of pollution to GNP *per capita*, population density or some other aggregate It seems clear from figures II and III that rising income levels tend to add pressure on both the supply of raw materials and the condition of the environment—both in quantitative and qualitative terms—more rapidly than does increase in population It is also clear that higher incomes add to the ability to combat pollution and to produce substitute materials

17 Inseparable from economic advance is modern technology, plus the financial, managerial and labour resources with which to apply it in industry, mining, agriculture, animal husbandry, forestry, fishing and the wide variety of accompanying services Wherever one looks in the more developed countries, one sees machinery and production methods that are potentially, if not actually, highly destructive to environmental quality giant strip-mining shovels, subsonic and now supersonic jet aeroplanes, millions of motor-cars and trucks (over 100 million in the United States and an annual production of 10 million), clear cutting and other forestry practices, factory vessels for ocean fishing, nuclear reactors, numerous applications of chemistry and biology in production These are a few examples that come quickly to mind. To the historic revolutions in agriculture and manufacturing, which began nearly 200 years ago, have been added the revolution-like changes of electric power, scientific management, nuclear power and heat, operations research and com-

[2] Figures I, II and III are taken from J L Fisher and N Potter, "The effects of population growth on resource adequacy and quality" in National Academy of Sciences, *Rapid Population Growth—Consequences and Policy Implications* (Baltimore, Maryland, Johns Hopkins Press, 1971), pp 222 234

Indicators of pollution sources in selected countries

Country or area	General indicators: Area (thousands of square kilometres): Total	Area: Agricultural[a]	Population: Total, 1965 (millions)	Population: Percentage urban	Population: Percentage employed in non agriculture	Population density per square kilometre: Total area	Population density: Agricultural area	Gross national product 1968: Total (thousand million dollars)	GNP: Per capita (dollars)	GNP: Per hectare agricultural area (dollars)	Specific indicators: Energy consumption per capita 1968 (metric tons)	DDT and other hydrocarbon imports 1968 (million kilogrammes)	Fertilizer consumption agricultural area, 1966/1967 (kilogrammes per hectare)	Paper and board consumption per capita, 1967 (kilogrammes)
Africa														
Egypt	1,000	28	29.6	38[b]	45	30	1,060	4.88	165	1,700	0.36	3.60[c]	10.0	6.0
Ethiopia	1,222	810	22.6	..[d]	12	18	28	1.48	64	18	0.01	1.08	..	0.5
Kenya	583	56	9.4	8[e]	12	16	170	1.14	116	200	0.14	1.05	6.4	4.0
Liberia	111	40	1.1	..[d]	20	10	27	0.23	210	57	0.27	..	..	2.0
Nigeria	924	220	58.0	16[f]	20	63	260	4.60	77	210	0.05	..	0.3	0.7
South Africa	1,221	1,020	17.9	47[b]	71	15	18	12.00	578	120	2.76	1.46	4.0	35.0
Sudan	2,506	310	13.5	8[g]	22	5	44	1.33[e]	104[e]	43[e]	0.09	0.46	1.6	0.9
Zaire	2,345	510	15.6	22[h]	31	7	31	1.73	108	44	0.06	..[d]	0.04	4.0
Asia and the Far East														
Hong Kong	1	1	3.7	73[j]	93	3,700	x	1.17	335	x	0.60	0.30	..	29.0
India	3,268	1,770	487.0	18[j]	30	149	270	43.80	88	250	0.15	21.90[c]	7.0	1.4
Indonesia	1,904	180	105.0	15[j]	34	55	580	10.70	91	590	0.13	0.11[i]	1.1	0.6
Japan	370	69	98.0	68	73	265	1,400	98.00	990	14,000	1.93	3.70[c]	307.0	88.0
Philippines	300	110	32.3	30[b]	43	108	290	9.00	268	820	0.21	11.48	15.0	7.0
Thailand	514	110	30.7	18[b]	22	60	280	4.65	147	420	0.12	4.05	5.4	3.0
Western Asia														
Iran	1,648	180	24.5	39[m]	43	15	140	6.64	263	370	0.83	5.31	2.6	4.0
Iraq	449	110	8.2	44	50	18	75	2.20	262	200	0.63	1.42	0.6	1.6
Israel	21	12	2.6	78[j]	88	124	210	3.92	1,490	3,300	2.25	0.50	33.0	43.0
Kuwait	16	1	0.5	..[d]	99	30	x	1.70	3,460	x	7.30	0.05	..	25.0
Saudi Arabia	2,253	20[i]	6.8	..[d]	22	3	340[i]	1.12[e]	172[e]	560[i]	0.54	0.12	5.0[i]	0.1
Turkey	781	540	31.1	26[b]	28	40	58	10.40	326	190	0.37	1.60	3.5	7.0
Northern America														
United States of America	9,363	4,400	195.0	70[b]	94	21	45	760.00	3,860	1,700	9.70	33.40[c]	29.0	232.0
Latin America														
Argentina	2,777	1,380	22.4	63[o]	82	8	16	18.70	818	140	1.47	0.80[c]	0.4	30.0
Bolivia	1,099	140	3.7	35[q]	35	3	26	0.67	178	50	0.22	0.06[i]	0.1	2.0
Brazil	8,512	1,370	81.0	45[b]	48	10	60	27.70	333	200	0.38	8.02	1.9	10.0
Chile	757	140	8.6	68[b]	74	11	60	5.14	576	370	1.12	0.54[i]	11.0	20.0
Mexico	1,973	1,030	44.1	51[b]	48	22	43	21.70	493	210	1.10	1.51	4.3	20.0
Nicaragua	130	18	1.7	41[f]	41	13	95	0.60	349	330	0.25	3.92	12.0	7.0
Venezuela	912	220	8.7	67[j]	71	10	40	7.90	879	360	3.20	0.40[i]	2.3	29.0

Europe														
France	547	340	48.9	63[e]	82	89	140	108.00	2,180	3,200	3.30	2.49[l]	99.0	80.0
Greece	132	86	8.6	43[j]	47	65	100	6.60	764	770	0.90	0.40	30.0	22.0
Ireland	70	47	2.9	46[j]	68	41	60	2.93	1,020	620	2.40	[d]	61.0	66.0
Netherlands	36	22	12.3	54[r]	91	342	560	20.70	1,660	9,400	3.70	3.40[l]	262.0	109.0
Poland	313	200	31.5	49[b]	58	101	160	[d]	600[l]	[d]	3.60	4.10[c]	72.0	29.0
Spain	505	300	31.6	57[b]	66	63	105	24.60	773	820	1.08	2.90[c]	25.0	30.0
Sweden	450	37	7.7	77	88	17	210	22.20	2,850	6,000	2.70	0.40[c]	108.0	171.0
USSR	22,402	6,100	231.0	48[s]	67	10	38	[d]	1,000[l]	[d]	3.80	1.63[l]	10.0	24.0
United Kingdom	244	150[l]	54.4	77[m]	96	233	360[l]	106.00	1,940	7,100	5.30	0.66[l]	110.0[l]	117.0
Oceania														
Australia	7,687	1,000[l]	11.3	82[j]	90	2	10[l]	25.20	2,170	250[l]	4.70	2.84	11.0[l]	104.0
Less developed countries[t]	66,000	15,800	1,530.0	24	32	23	97	218.00	150	140	0.28	[d]	3.4	4.5
More developed countries[t]	33,000	8,700	675.0	65	84	20	78	1,170.00	1,800	1,300	5.00	[d]	35.6	127.0

SOURCE: Compiled from J. L. Fisher and N. Potter, "The effects of population growth on resource adequacy and quality", in National Academy of Sciences, *Rapid Population Growth—Consequences and Policy Implications* (Baltimore, Maryland Johns Hopkins Press, 1971), pp. 229-231

[a] Sum of arable land and land under permanent crops together with permanent meadows and pastures Excluding forested land, land unused but potentially productive, and built on area, wasteland and other. Figures are rounded and in some cases adjusted downwards because of the difficulties of drawing a line between pastures and wasteland, particularly in the case of rough grazing land

[b] 1960

[c] Agricultural use in 1966

[d] Information unavailable

[e] 1962.

[f] 1963

[g] 1956

[h] 1957

[i] Statistically insignificant

[j] 1961

[k] Not computed

[l] Data incomplete or doubtful

[m] 1966

[n] Estimated total consumption, in all uses, 1968

[o] 1947

[p] Agricultural use in 1963

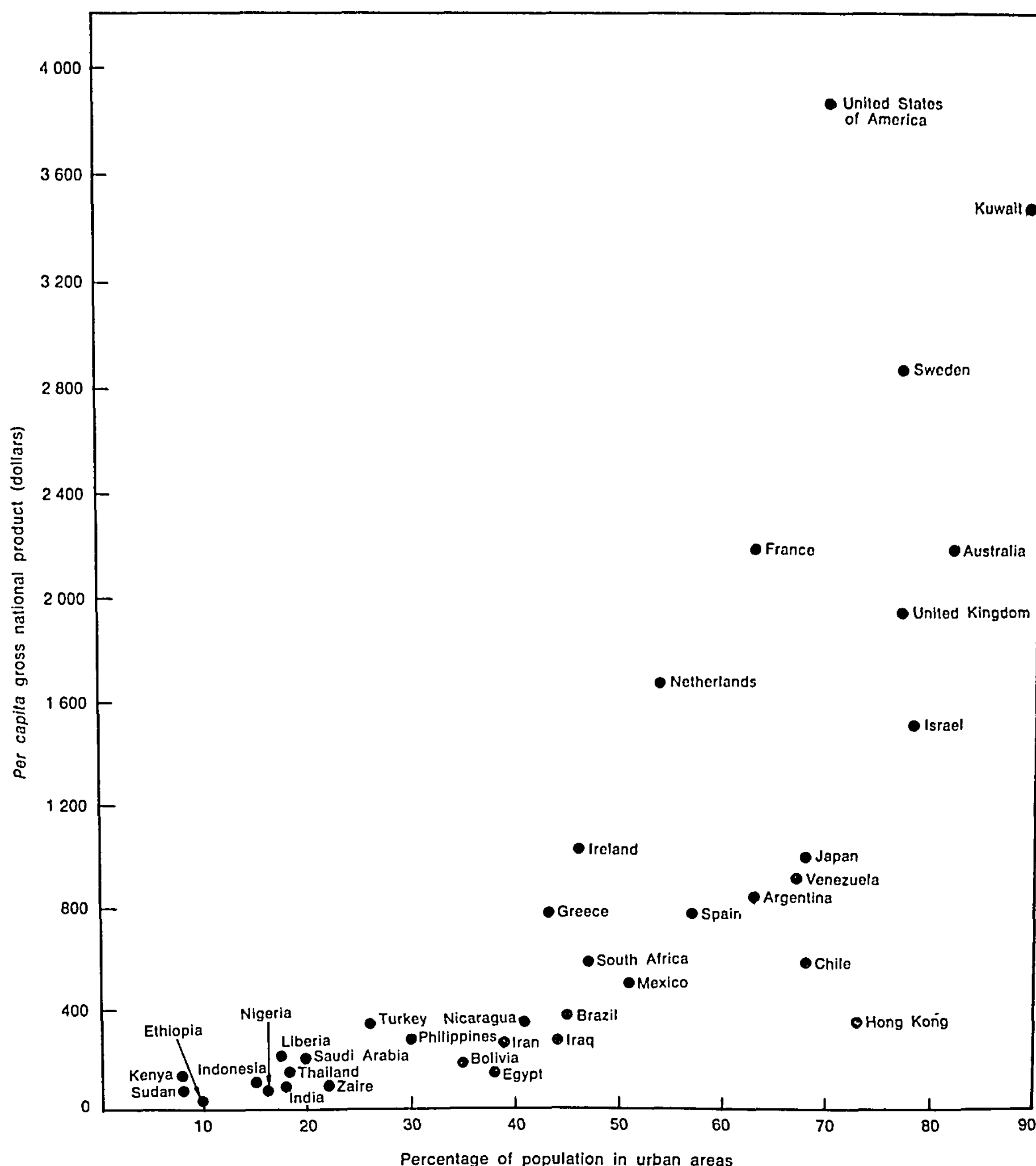
[q] 1950

[r] 1964

[s] 1959

[t] Excluding centrally planned economies and Yugoslavia

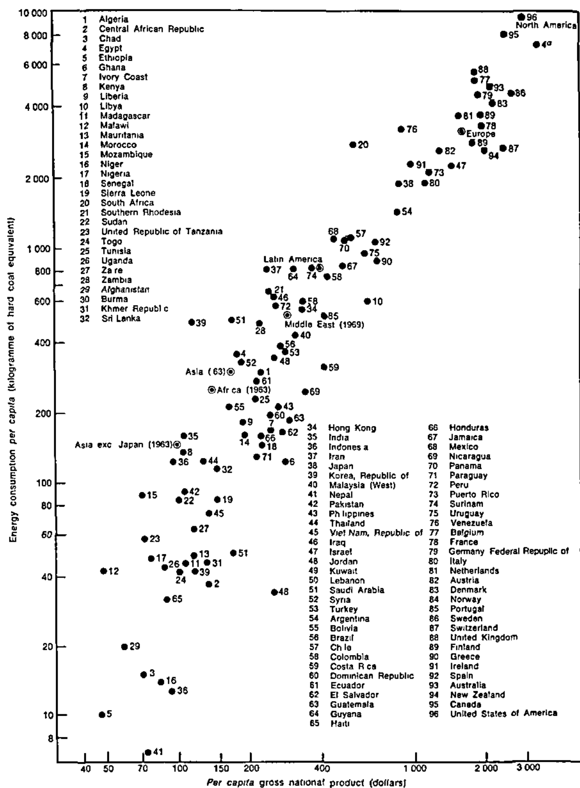
Figure I. *Per capita* gross national product and percentage of population in urban areas



puter control of production processes and the development of a myriad of synthetic products from relatively common raw materials. The pace of technological innovation seems always to quicken and to be on the verge of outstripping man's capacity to govern, channel and control what is happening. The mere thought of the problems piling up in front of him has created what has been termed "future shock", which is now felt, in varying degrees, by nearly everyone in more economically advanced countries.

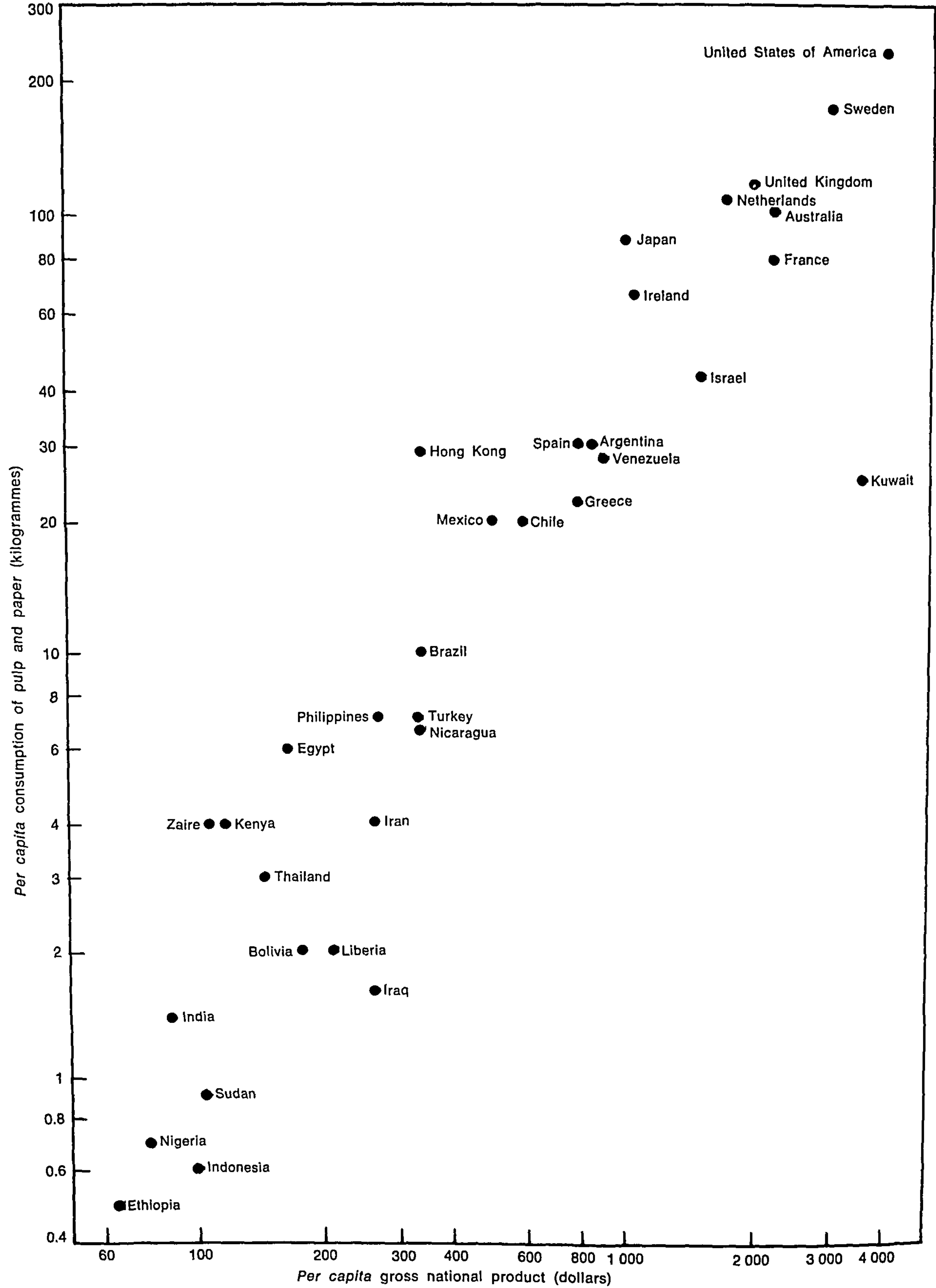
18. Ironically, the solution of many of the environmental problems resulting from technology requires the application of yet more technology. For example, the petrol-powered internal-combustion engine yields the major share of air pollution in the urban areas of the more developed countries (nearly all of the carbon monoxide and most of the hydrocarbons). But the more feasible correctives require new technologies, such as afterburners, stratified charge designs, the Wankel, fuel cells and steam-engines. The full environmental effect of a new technology is frequently difficult to assess and may turn out to have a result opposite to that intended. The catalytic converters to be required by 1976 on all motor-cars produced in the United States appear likely to increase fuel consumption per mile to such an extent as to negate much of the very advantages that were to

Figure II. *Per capita* energy use and gross national product, 1963



Note Excluding centrally planned economies.

Figure III. *Per capita* gross national product and *per capita* consumption of pulp and paper



be achieved in the reduction of air pollution, and, at the same time, to eat still more into dwindling supplies of petroleum In this case, some environmental quality improvement is being won at the expense of a diminution of raw-material quantity. The total environmental bill for a new technology needs to be reckoned and then compared with the total bill of alternatives, including the way the function is currently being performed. It has been noted already that much of recently applied technologly, as well as that now in sight, appears to have environmentally perverse results on balance, with the relatively rare, non-degradable and toxic supplanting the more common, degradable and benign materials (for example, detergents for soap and plastics for paper)

19 In addition, social and behavioural traits now common in the more economically advanced industrial and post-industrial societies account, in significant measure, for the accelerated deterioration of the natural environment. As producers, people in such societies greatly prefer to use machines and electric power rather than their own human labour. For transportation, they prefer the speed and comfort of aeroplanes, trains, motor-cars, trucks and omnibuses to horse-drawn vehicles As consumers, they prefer plastic containers, chemical solvents and throwaway bottles Modern urban families live in a dispose-all system everything neatly disposed of from their point of view, but still to be coped with by the community at large. Large differences persist in matters of personal attitudes towards the environment; Scandinavian standards of cleanliness and order seem high to visitors from other places, for example No doubt it will prove to be extremely difficult to reverse trends in habits of behaviour such as those indicated here, even with the prodding of incentives and penalties. One wonders if elements of the recent ecology and zero growth movements will take root and flourish widely and rather hopes they will Care of the environment and thought for the future are largely personal matters with which each individual must come to terms. Until changes of this kind come about and are built into behavioural patterns and given institutional sanction, progress in environmental improvement will be slow and hard to sustain

20. Estimates of particular kinds of air and water pollution in the year 2000 have been prepared for the United States under several different assumptions as to future population and gross national product. [3] Figure IV presents high (approximately three-child families) and low (approximately two-child families) estimates for 2000 and 2020 Corresponding estimates are also shown for GNP and GNP *per capita*, with four combinations of high and low population and GNP figures. The high GNP is substantially above that which would result from a straight projection of the long-term annual average rate of increase, the low GNP is slightly below the long-term projection The two higher projections (high population-high GNP and low population-high GNP) serve to reveal alternative possible futures that would tend to place relatively severe strain on the environment, as well as on supplies of raw materials The two lower projections represent easier situations

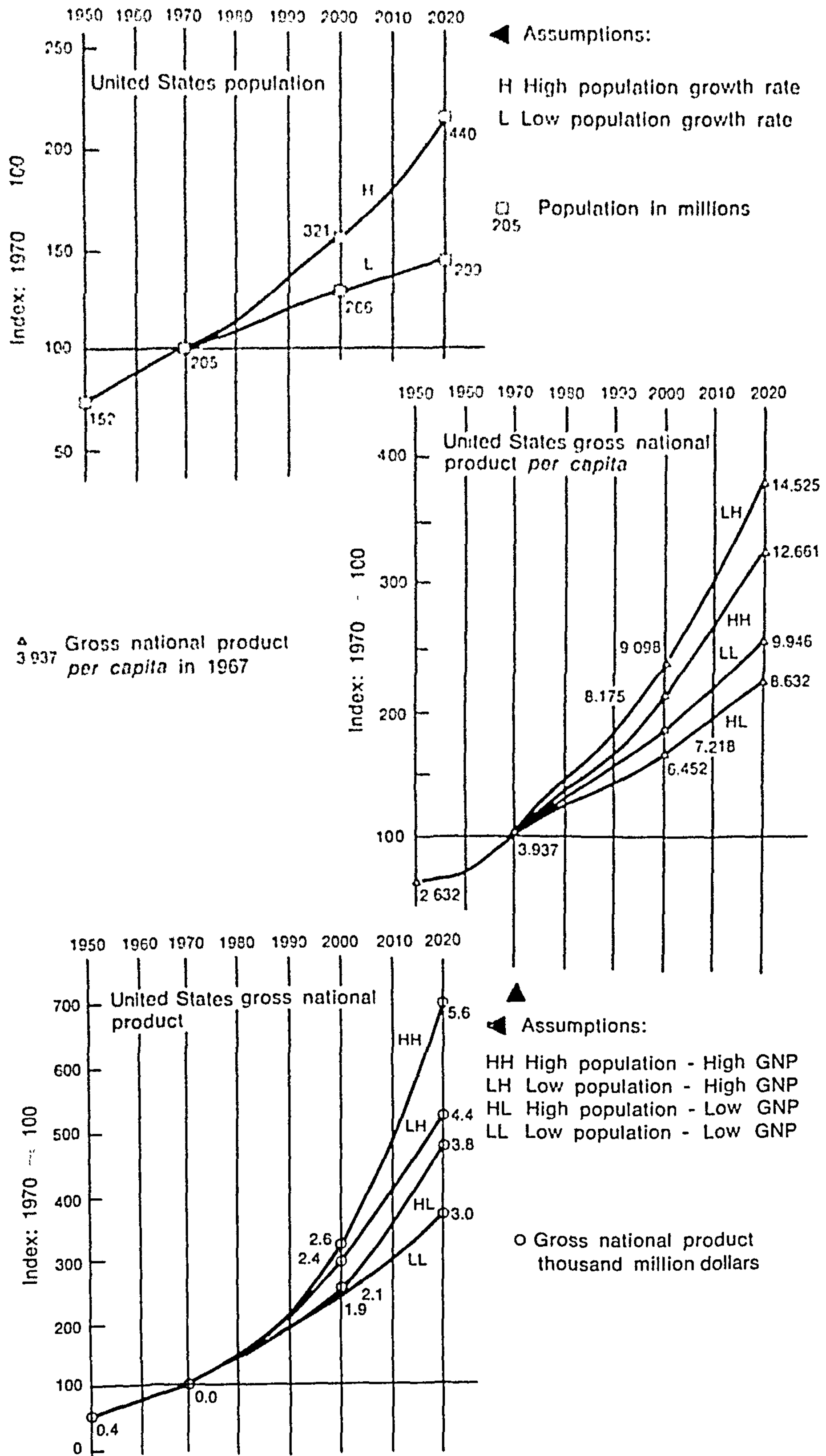
21. The air pollution consequences (particulates, hydrocarbons and oxides of nitrogen) and the water pollution consequences (biochemical oxygen demand, suspended solids and dissolved solids) are depicted in figure V Each of the four futures is shown here in terms of three different assumptions as to technology and policy The most striking (and hopeful) prospect revealed in these estimates is that with production and treatment processes that would probably be induced by an active pollution abatement policy, the amount of pollution generated and emitted in the year 2000 would be far, far less than under the alternative assumptions and for most of the pollutants even less than the actual amounts for 1970 According to this way of examining the future of one highly developed country, vigorous policies for preventing and abating pollution can make a decisive difference It has to be recognized, of course, that any positive and continued rate of increase of pollution or environmental damage, even if it does not commence until after 2000, will ultimately lead to disaster But in the longer run of the twenty-first century and perhaps beyond, human behaviour, not to mention laws and institutions, can change markedly For these adjustments, time is of the essence and policies that buy time are desirable

22 The consequences of pollution and environmental disruption, certainly in their modern, high-technology, synthetic-compound form, have been far more severe in the more developed than the less developed countries. The harmful results are indicated, in part though not in full, by effects on human health, natural ecological systems, economic functions, social welfare, amenities and aesthetic factors Those effects which are long-lasting or irreversible, widespread, multiplying over time in intensity and lethal or highly damaging are, of course, the most significant Pollution and related effects may be arrayed according to their severity· those which disarrange the genetic structure of human, animal or plant life, those which undermine or distort basic ecological support systems or climate, those which are harmful to health and otherwise impair the functioning of people, those which diminish the aesthetic quality of the environment and the way people have to live; those which are costly in money and effort to prevent or correct; and those nuisances which reduce the social amenities and delights of living in a clean and ordered environment. [4]

[3] R G Ridker, ed, *Population, Resources and the Environment*, vol II of Commission research reports of the Commission on Population Growth and the American Future (Washington, D C, Government Printing Office, 1972) The estimates are based on a dynamic 185-sector model of the United States economy (the University of Maryland Inter-Industry model) developed by Clopper Almon

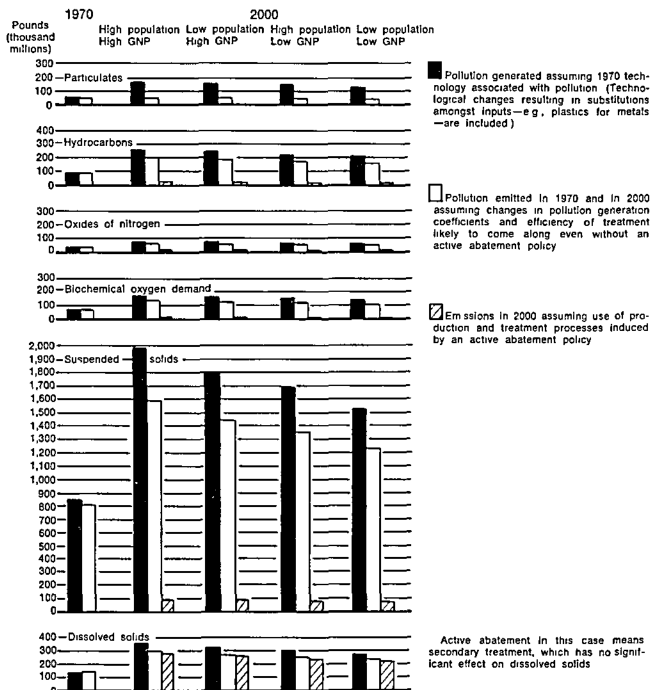
[4] Sterling Brubaker, *To Live on Earth*, for Resources for the Future (Baltimore, Maryland, Johns Hopkins Press, 1972)

Figure IV. United States of America: population, gross national product and gross national product *per capita*



SOURCE: R. G. Ridker, ed., *Population, Resources and the Environment*, vol. III of Commission research reports of the Commission on Population Growth and the American Future (Washington, D.C., Government Printing Office, 1972).

Figure V. United States of America: pollution generated and emitted under alternative assumptions



SOURCE R G Ridker, ed, *Population, Resources and the Environment*, vol III of Commission research reports of the Commission on Population Growth and the American Future (Washington, D C, Government Printing Office, 1972)

23 Statistical indicators of pollution effects abound but, unfortunately, are not yet available on either a comprehensive or comparable basis for the countries of the world, or even for the more developed countries. The establishment of new environmental programmes and agencies, in the more developed countries especially, promises that the deficiency of such indicators will soon be reduced. International agencies and, in particular, the United Nations Environment Programme, will be looked to for leadership in this activity without which it will be difficult to keep track of what is happening to the condition of the environment. Systematic monitoring of the amounts of pollutants in sufficiently fine detail will be difficult, but simple compared with

statistics concerning sulphur oxides in the urban air, biochemical oxygen demand in the water, or carbon dioxide in the upper atmosphere into their effects on human health and welfare or on the viability of ecosystems. Coefficients that relate health and other conditions to the incidence of a particular pollutant, or to symbiotically related pollutants, are generally crude and inadequately verified. Even less clearly established are measures of risk-benefit relations, which define the uncertainties involved in finding answers to the question of how much risk may be justified to obtain a particular benefit. Further efforts are also needed to state the private and social benefits and costs in economic terms that will be helpful in making decisions with regard to alternative courses of action. In this latter connexion, care must be taken that non-economic information is given proper weight in decisions, especially those dealing with very long range factors, the benefits and costs of which are hard to measure. The process by which environmental decisions are made and the significance accorded different kinds of evidence and argument are more important than detailed numerical calculations.

24. No extended consideration of the various consequences of a polluted environment is presented here, but their ultimate importance and the necessity for monitoring them closely is noted. Nor has there been an attempt to delineate how these consequences bear differently on the several more developed countries or within each country on different regions and social groups. Obviously, as mentioned earlier, most pollutants are concentrated in the urban areas where, in most of the developed countries, well over half the national populations live. The poor in every country suffer more from environmental degradation, because they tend to reside and work in central cities, where air pollution, traffic congestion, solid-waste problems, poor housing and lack of recreation facilities are concentrated, rather than in suburbs. Furthermore, the poor are less able to escape or buffer themselves from these conditions.

Policies for environment improvement

25. Considering this survey of environmental problems, sources and consequences in the more developed countries, one may ask what lines of policy, what broad programmes, would be helpful in preventing and abating pollution and arresting further deterioration of the environment. One clue can be found in the analysis of some principal sources or causes of pollution. The two basic factors which, at least in an incipient way, make for environmental quality problems are population density and *per capita* production (or income). Evidence such as that presented in figures I-III, relating population and production to such pollution-associated activities as energy consumption, indicates that the more densely populated and highly industrialized countries have incipient conditions for greater environmental pollution. Less industrialized and less densely populated countries can gauge from such scatter diagrams their own likely path towards pollution as they grow in population and industry, assuming they actually do follow the growth patterns of the more developed countries.

26. Whether the more developed countries are actually experiencing more—or less—environmental pollution than less developed countries is a complex question. If investment and other efforts to abate or prevent pollution were the same in both, then environmental conditions would no doubt be worse in the more developed regions. As things now stand, however, people in the less developed regions seem to be worse off. Their water-supplies are usually less pure, both solid-waste and sewage problems are severe, housing conditions very bad and public health levels low. Densely populated urban slums and poverty-stricken rural villages alike are characterized by physical environments of generally poor quality, although specific conditions vary from one situation to another. In the large cities of less developed countries, air pollution and congestion will typically be worse than in villages; but public health services, water-supply and job opportunities will be better.

27. Turning again to the more developed countries, it appears likely that some further reduction in fertility rates moving towards the maintenance of unity net reproduction, where this has not already been reached, will contribute to a cleaner, more healthful and acceptable environment. This will be true especially during the years immediately ahead, when the cohorts of children will be relatively small and the cohorts in the working ages relatively large. Indicated policies include more vigorous family planning, changes in income-tax deductions and in other tax law provisions which favour having children, replacement of anti-abortion laws with carefully regulated abortion on a voluntary, medically sound basis and informational and educational programmes designed to encourage people to want small, maintenance-level families.

28. In the more developed countries, increasing production and consumption *per capita* account for a greater load of pollution than does increasing population. With national production rising at from 3 to 8 or 9 per cent per annum in these countries and with population rising at 1 per cent or less in most of them, it can be seen that economic growth is responsible for the major part of additional pollution. In this situation, there is some logic in advocating a policy of slow, or even zero, economic growth. Such a course, unfortunately, presents serious problems for poor people (and for depressed industries and regions) who could gain only at the expense of the more affluent. A shift to zero growth would also have profound implications for new investment and other dynamic features of both free enterprise economies and centrally planned economies. It would entail institutional and behavioural changes, the nature of which can be visualized only dimly. Even so, policies to check rates of economic growth at the higher end of the scale would appear desirable, especially if

such rates are thought to be difficult to sustain and if they involve distortions of normal investment-consumption patterns Active pollution abatement efforts are strongly indicated in any case.

29 Fortunately, not all economic growth adds significantly to pollution, so that zero growth is not necessary on this account As stated earlier, pollution results mainly from particular, identifiable raw materials, particular industrial and agricultural processes and products and particular modes of consumption Internal combustion engines, coal- and oil-burning plants for generating electric power and a few other activities account for most of the air pollution Industries producing pulp and paper, certain chemicals, food-processing, iron and steel, and a few others give rise to much of the water pollution in more developed countries Curtailment of these industries is not so necessary as are strict standards on emission and discharge of pollutants, the redesigning of processes and products and the substitution of less polluting raw materials These circumventions require capital funds, research, labour skills and an extensive technological base from which to work The indicated policies include vigorous research and development, emission charges or penalties to reduce pollution from particular sources and strict and fair enforcement of environmental standards

30 Most anti-pollution policies and programmes will be national in scope; but some, to good advantage, can be intra-national and some international Within countries, settlement patterns and the location of certain industries can be influenced so as reduce pollution and disfigurement of the environment Transportation routes and utility lines can also be planned with the same end in view A basic issue is whether to concentrate waste generating activities primarily in cities, so as to be able to deal with waste more economically, or to disperse such activities, so as to equalize waste loading over the whole country At the intra-national level regional approaches make good sense: the river basin for water pollution, the air shed for air pollution; the metropolitan area for traffic congestion; housing and community planning, and solid waste disposal. Modern computerized systems analysis, frequently embracing atmospheric, hydrological, demographic, technological, economic and even social subsystems, can be used for understanding these matters and appraising the relative merits of alternative policies In such instances, it will typically be found that new laws, institutions and administrative organizations are necessary to deal successfully with these regional situations Many examples of the regional approach, both existing and contemplated, come to mind, the Ruhr, the Rhine valley, the Po, the Thames, the Delaware, the air sheds of London, Paris, Tokyo, Moscow, New York, Los Angeles; and numerous agricultural and forest regions

31 International approaches to pollution problems will also be helpful and, in certain cases, necessary if progress towards a better world environment is to be made The more developed countries, where many of these problems are acute and which have greater financial and technical capacity for solving them, must take the lead International initiatives are called for or need to be strengthened in response to several challenges [5]

32 Much can be learned through exchanges of experience at the national and intra-national levels in trying to improve the environment, whether by means of limiting population growth, redirecting technology, penalizing pollution-causing activities, altering the location of industries and settlements, developing cleaner sources of energy and more efficient modes of transportation, or creating new regional institutions for pollution abatement

33 Many river basins and air sheds spread over more than one country Co-operative schemes are necessary, not only for gathering hydrologic data and measuring the amounts and occurrence of pollutants, but for apportioning and managing water-supplies, sewage discharges, atmospheric loadings of pollutants, location of polluting activities and provision of outdoor recreation and other amenities Effective incentive, penalty and enforcement programmes will also have to be undertaken on a co-operative basis

34 Certain pollutants spread more or less rapidly over whole continents or even the world Those which are highly toxic or which may seriously distort major-support ecosystems require international control based on reliable monitoring Obvious examples are radioactive isotopes, DDT and other chlorinated hydrocarbons used primarily as insecticides, carbon dioxide in the upper atmosphere (about the effects of which there continues to be dispute), oil spills principally from tankers and off-shore drilling operations and perhaps heat discharges from electric generating plants and other sources Most of these pollutants have potentially deleterious effects on atmospheric, ocean or meteorological systems and are continental or world wide in scope Especially in need of control are those effects which are irreversible, long-lasting and widespread in their effects

35 Next in line for consideration are those internationally traded goods (or services) which, in some sense, embody pollutants. If this embodiment is taken literally and the traded product is actually contaminated, the case for import prohibition or control is clear If, however, the traded article embodies a pollutant only in the sense that it was produced in a way that resulted in an amount of pollution in the country of origin which would be unacceptable in the importing country whose own competing industry has to meet higher standards, then the case for international control is less clear and presents difficulties "Pollution havens" in less developed countries (or in more developed countries for that matter) will be resented in importing countries that enforce high environmental standards Yet, industrial

[5] C S Russell and H. H Landsberg, "International environmental problems—a taxonomy", *Science*, vol CLXXII, No 3990, pp 1307-1314

areas in less developed countries typically have far fewer chemical forms of air and water pollution and, of course, are in greater need of industrialization as a means of raising material levels of living. A reasonable argument could be made for an international agreement to permit greater discharge of pollutants in less developed countries, varying the amounts inversely with average *per capita* incomes. In this way, as a country became more industrialized and richer, it would have to apply higher environmental standards to the production of internationally traded goods. Such an approach would have to be elaborated carefully with regard to the differences among both pollutants and countries. Possibly a programme of this kind could be launched first among the more developed countries with other countries joining later.

36. No doubt the international community of more developed countries could be more ingenious in devising incentive, regulatory and educational programmes for promoting environment improvement among themselves. Loans, technical aid and exchange, and joint training and demonstration activities are among the ways for doing this. Both international agencies and multinational firms, as well as international labor unions, professional organizations and political pressure groups, could play a role in this.

37. Lastly, an intensification of co-operation among the more developed countries in research and development promises high returns in environmental protection. Here, the possibilities for joint action are open and invite further attention by ecologists, engineers, economists, sociologists, planners, industrialists and many others.

38. The costs of an adequate programme of environmental improvement for the more developed countries are difficult to estimate, not only because of technological and economic uncertainties, but because the expectations people have for a cleaner, less polluted environment continue to rise. A programme of public and private outlays for the next decade or two in the United States of America might amount to 2 or 2.5 per cent of the gross national product, compared with around 1 per cent in 1972. In dollars, this would represent an increase from $12 thousand million to between $24 thousand million and $30 thousand million, and would rise in the future with a growing GNP. Over a 10-year period, this would mean an expenditure of up to some $400 thousand million. Some relatively small portion of this is likely to be made available for stricly international programmes. These amounts could turn out to be much larger, depending upon future events. If the other more developed countries were to devote a comparable portion of their GNP to environmental programmes, the total expenditures of all the more developed countries would reach well over $1,000 thousand million and perhaps as much as $1,500 thousand million. Much of a comprehensive anti-pollution programme would not require governmental, or even private, outlays, but would be accomplished by means of process changes in industry and agriculture and behaviour changes by people that in the end would involve no net increase in cost and might even result in cost reductions. Programmes of this magnitude could be financed out of general or specific revenue sources of governments, private firms and individuals. The government portion, in part, could come from special pollution emission or discharge taxes. International financial requirements could be met, in part, from general sources available to the United Nations or other organizations. Possibly new sources could also be tapped, such as a modest charge on international oil or other shipments or from rents on the exploitation of the common property resources of the oceans.

39. It is difficult to draw simple, direct conclusions about population from environmental conditions. Major factors intervene, such as technology, settlement patterns, social infrastructure, private investment, consumption patterns and political institutions, to name a few. Despite all this, by way of summary one can indicate a few broad positions and policies that make sense concerning population policies for more developed countries.

40. First, most of the more developed countries have arrived at a demographic condition in which the long-run tendency is towards population stability, or very nearly so. This being the case, no additional policies or measures of a positive nature are called for, except possibly a somewhat more energetic pursuit of existing efforts to reduce birth rates and, thereby, to reduce the absolute increase in population caused by the bulge in the number of persons in the childbearing ages. Unwanted births, especially, should be reduced. Demographic factors should be monitored closely. If net reproduction rates start moving upwards again, appropriate actions to check such movement should be taken promptly. Plans for doing this should be kept in readiness, covering such matters as tax advantages for small families, free contraceptives and perhaps abortions in specified circumstances and accelerated information and education for birth control.

41. Secondly, settlement patterns and industrial location may be influenced by deliberate policies in ways that reduce harmful environmental disruptions. Several alternatives are possible. Metropolitan areas could be organized more compactly, for example, along a few high-density corridors, to reduce the need for air-polluting private motor-cars and to permit more efficient handling of sewage and solid waste. Or, future population and industrial growth could be guided away from existing large cities to dispersed smaller cities or new towns. This alternative may entail the loss of large-scale economies, which would have to be traded off against environmental and other benefits.

42. Thirdly, environmental pollution and disfigurement appear to hurt the poor more than others in the population. The poor are concentrated in and near the urban centres where air pollution, congestion, noise and solid waste are also concentrated. In addition, the poor are less able to move away from an undesirable environ-

ment, permanently or temporarily, or to buffer themselves from its effects The remaining poor in the more developed countries are located in rural, depressed areas, depending upon depleted resources, such as high-cost coal mines or marginal agriculture. As with other policies, *environmental policies should take special care* to improve first the condition of the poor, thus redressing somewhat the distribution of real income, including qualitative components, in their favour The payment for such environmental improvements through general tax revenues (especially income taxes and property taxes) will tend to benefit the poor differentially, as will payment through inclusion of environmental costs in the selling prices of goods and services (especially of luxury goods and services) However, there are more direct and effective ways of improving the lot of the poor than by environmental policies, for example, by income supplements, social insurance, and health and educational benefits

43 Fourthly, an attack on environmental pollution *and disruption through population policy, at least in the* more developed countries, is likely to be clumsy and far less effective than a more direct attack through environmental policies. These policies should be broad and diversified and should depend upon the particular problems, economic capacities, social institutions and political realities of the various countries As a general policy, there is much to be said, as mentioned earlier, for a policy of including environmental costs, to the extent that they can be determined, in prices. Schedules of emission charges levied on specific pollutants offer advantages in this regard principally by minimizing distortions in price competition and factor allocations Other environmental disruptions, certainly those of a severely damaging or lethal character, will have to be prohibited outright with the highest penalties for disobedience Where the sources of emission are hard to locate, the feasible approach is to set ambient standards and then ration permitted loadings of pollutants or tax *over-loadings progressively An even better approach* for the longer run is to establish incentive schemes (tax preferences, research and development assistance, access to raw materials and markets etc) to encourage new technological processes which will bypass environmental damage altogether or induce recycling and reclamation of waste materials

44 Fifthly, population problems encompass more than those of gross demographic trends, of poor people, of settlement patterns and of technological or economic matters Population policy must deal with more than these elements Especially important are those policies which attempt to deal with the effects of environmental disruption on longevity, on particularly vulnerable groups, such as the elderly, youth and handicapped, on work performance of the labour force, on the physically and mentally ill, on accidents and ultimately on the enjoyment of life and human freedom Medical scientists, psychologists and philosophers can contribute to an understanding of population aspects of these matters

45 Lastly, despite many similarities, profound differences exist and will continue to exist for a long *time between the more and the less developed countries* These must be understood and taken into account when formulating population policies for more and less developed countries and to some extent on a global scale The twin objectives of zero economic growth (at least reductions in economic growth) for the more developed countries and zero population growth (at least reduced population growth) for the less developed countries are attractive as general, long-term directions in which to move Much analysis, experimentation and education undoubtedly will be necessary if the population and economics of the world are to unfold along these lines At any rate, one conclusion seems clear population policies in the more developed countries (and resource, environment and economic policies as well, for that matter) should be conceived and put into operation only after considering most carefully their likely effects on the less developed countries Those policies which serve the proper concerns of the less developed countries, as *well as those of the more developed countries, are* greatly to be preferred

ENVIRONMENTAL PROBLEMS OF THE DEVELOPING COUNTRIES*

*S. H. Ominde***

1. A critical examination of the contemporary world shows two very contradictory tendencies in the intellectual concern and practical approach to world problems. First, there is a global feeling of hopelessness in the face of conflicting and at times opposed international interests. This is the world of national development and safeguarding of the national identity and integrity. It is the raw material of international politics and events that permeates day-to-day concern of the international community.

2. In the second place, there is emerging an increasing global concern for the context of man's development problems on the spaceship earth. The second is the stark reality of a world of widening international and national disparities in incomes and living opportunities. At the national level it is expressed in the mounting criticism of the gross national product (GNP) as a measure of national development. At the international level, there is increasing condemnation of the deepening gap between the affluent and the indigent countries and the persistent failure of the human community to resolve the dilemma through existing institutions.

3. Within a relatively short period of time, the world has been thrown into an intellectual ferment in conceptualizing problems which earlier were only seen dimly but which, with increasingly effective techniques of measurement and analysis, are becoming staggering in proportions. Central to these developments is the theme of population and environment. In this process, the world has been exposed to some of the most striking dimensions of the continuing drama of man's survival on the planet. What is referred to specifically here is the intense activity which culminated in the United Nations Conference on the Human Environment at Stockholm in June 1972.

4. There is yet a further characteristic trend of which mention should be made. This is the observable narrowing of the gap between the analysts of the problems and the policy-makers on the two vital issues of population and the welfare of man as a global goal. But welcome as these developments are, the concern with these vital issues is still confined to a small minority of mankind and a minority of countries. The vast majority of the countries of the world are approaching and involved in the crisis with an incredible lack of concern. This is indeed an over-statement of the problem. But, it is a needed caution to underline the need to increase the global, national and individual awareness of the issues at stake. Considerable progress has been made during the decade of the debate. Out of the critical thinking has emerged a clearer view of the nature of development, the nature of the population problem as it affects the regions of the world, individual countries and the persons for whom those countries are planning.

5. From the conceptual point of view, the United Nations Conference on the Human Environment represented a milestone in the definition of the concept of development. At the Conference, nations of the world became aware of the need to recognize the legitimacy of a developing world view of development and its problems. A divergent approach to environment and development which encouraged speculators to forecast irreconcilable differences between the affluent and poorer countries of the world was resolved. It was resolved through a fundamental consensus on the concept of development and in particular on the acceptance of the special role and character of the population problem in development.

6. The Conference at Stockholm raised the basic distinction from the environmental point of view between the development problems of the high technologies and those of the developing world.[1] Development impact on the environment for the developed regions of the world was seen in terms of problems of production costs which disregarded external diseconomies, the pressure of modern urbanization and the risk of scarcities in materials and energy as a result of the exponential growth. To the developing world, the environmental issue focused attention on changes triggered by the population crisis and the related problem of lack of development. For the developed regions of the world, the United Nations report on development and environment had this to say on the outcome of a high level of economic development:

> "The creation of large productive capacities in industry and agriculture, the growth of complex

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[1] B. Ward and R. Dubos, *Only One Earth: the Care and Maintenance of a Small Planet* (New York, W. W. Norton, 1972), pp. 46-145; D. H. Meadows and others, *The Limits to Growth: a Report for the Club of Rome's Project on the Predicament of Mankind* (New York, Universe Books, 1972).

systems of transportation and communication, the evolution of massive urban conglomerations, have all been accompanied in one way or another by damage and disruption to the human environment." [2]

7 But while recognizing the commonality of problems of development and the need to take them into consideration for future planning, the development problems of developing regions were emphatically stated in the report in these terms:

> "However, the major environmental problems of developing countries are essentially of a different kind They are predominantly problems that reflect the poverty and very lack of development of their societies They are problems, in other words, of both rural and urban poverty In both the towns and in the countryside not merely the 'quality of life' but life itself is endangered by poor water, housing, sanitation and nutrition, by sickness and disease and by natural disasters " [3]

8 Other indexes are drawn upon below to underline the distinctions mentioned But the one concerning capital must be stressed here Many countries of Asia, Africa and South America have been experiencing an acute shortage of capital for investment in development programmes It is estimated that Asia, with over half of the total world population, can claim only one tenth of the world's national income North America, with less than 10 per cent of the world population, accounts for nearly 45 per cent of the world's national income Asia, Africa and South America together account for well over two thirds of the world population, but receive only 15 per cent of the world's national income The remainder, with only 35 per cent, receive about 85 per cent of the world's national income [4]

9 However, it would be misleading to rank the United Nations Conference on the Human Environment as providing an opportunity for the world regions to underline their differences The warning that the problems arising out of the process of development are also in evidence in developing countries should be noted The basic conference document underlined the specific role of population in the following terms:

> "The very growth of population when not accompanied by adequate economic development, brings out the prospect of rising unemployment further impoverishing the countryside and swelling the drift to the towns and creating human problems of the deepest intensity They can only aggravate the serious social and political tensions that even now prevail in these societies " [5]

10 These are the problems that strike at the very roots of international peace, the harmonious development of individual countries and, in particular, man's effort to rise above the level of penury which afflicts the greater proportion of humanity

11. This paper considers first the global, regional and national dimensions of the problem of population with special reference to developing countries In the following sections, attention is directed to the consequences of the problem to development objectives, the severity and the likely trend Lastly, consideration is given to the possibilities that technology offers at the international and national levels to the solution of the problems

POPULATION PROBLEMS OF DEVELOPING COUNTRIES OF THE WORLD

12 Concern with the interrelationship between human numbers and human welfare is not new It is the environmental component of the problem that is a relatively new dimension Both are problems which, for specific reasons, could only be stated with clarity in the twentieth century It is the twentieth century that produced the technology which brought the population problem to the forefront of international concern Further, it is the combined effect of international and national efforts towards more accurate population information in the twentieth century that now permits a statement of the population problems and their solution with a tolerable degree of precision In this context, one must first take up a statement on the current situation from two scholars who have contributed a great deal to public awareness of the problem in the twentieth century

13 Ehrlich, continuing his crusade initiated with the publication of his took, *The Population Bomb*, sees the global crisis in the following terms

> "The human population is not only too large, it is growing at a mind-boggling rate—about two per cent per year At this rate, the population doubles every 35-40 years Every year seventy million people are currently being added to this planet—every three years an equivalent of the United States to feed, clothe and house " [6]

14 Of the consequences, he pointed out that roughly 15 per cent of the people in the world live in affluence and that about 60 per cent live in utter misery and the remainder are on the border line He goes on to say

> "Hunger and malnutrition are most prevalent in the underdeveloped world, where birth rates are high and the majority of the people live in poverty. Most vulnerable to both hunger and malnutrition are young children and mothers Protein malnutrition in pregnancy, infancy and early childhood can result in

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[2] "Development and environment" (A/CONF 48/10), report [illegible]

[illegible]

[5] Development and environment', *loc cit*, annex I, para 9

[6] Paul Ehrlich, "The population crisis where we stand", in Noel Heinrichs, ed, *Population, Environment and People* (New York, McGraw Hill, 1971), p 8

permanent stunting of growth and damage to the brain if the child survives. High infant and child mortality rates in part reflect the high incidence of malnutrition in underdeveloped areas." [7]

15. Hauser, as a corrective to undue emphasis on excessive fertility and excessive rates of population growth, has underlined three dimensions in the global aspect of the problem. These dimensions are: the accelerating rate of population growth during the three centuries of the modern era; the increasing concentration of the peoples of the world on relatively small portions of the earth or urbanization; and the heterogenity of peoples increasingly being forced to share the same life space. [8]

16. Summing up the regional aspect of the problem to the United Nations Conference on the Human Environment in Stockholm, the Secretary-General of the United Nations referred to it as the problem of the "North" and the "South":

> "Everything is of concern to everybody in our deeply interdependent world today. The South is preoccupied that a reduction of growth in the North might lead to a reduction of their exports of raw materials which is their lifeline to progress. The South is also beginning to realize that the North which consumes two thirds of the world's resources might damage irremediably the oceans, the earth and the atmosphere which are the sources of life for all. The North is worried by the great number of people in the South, who continue to increase. These large numbers, if multiplied by increased consumption and industrialization, will be a main factor in tomorrow's world environment. The North, therefore, appeals to the South not to repeat the mistake it has made when it industrialized and developed." [9]

17. But the statements so far considered are very much in the realm of generalities. The global position on the population situation can certainly be stated more concretely. The United Nations estimates for the half-centuries prior to 1950 suggests that by 1750, the world had a total population of approximately 791 million, of which 201 million were in the more developed and 590 million in the less developed regions. By the beginning of the present century, the total population of the world was estimated at 1,650 million, with 573 million in the more developed parts of the world and 1,077 million in the less developed regions. [10] Table 1 summarizes the global position of the world's total population, the share of the more and less developed regions and the respective annual rates of increase.

[7] *Ibid.*

[8] Philip M. Hauser, "On population and environmental policy and problems", in Noel Heinrichs, ed., *Population, Environment and People*, pp. 17-34.

[9] "Beyond national castles", speech by the Secretary-General of the United Nations to the United Nations Conference on the Human Environment, Stockholm, June 1972, in *Environment Stockholm* (United Nations publication, Geneva, 1972), p. 20.

[10] United Nations Secretariat, Population Division, "Demographic trends in the world and its major regions, 1950-1970", *Population Debate*, vol. I, part two, table 1.

TABLE 1. WORLD POPULATION BY DECADES, 1900-1970

	Population (millions)			*Annual rates of increase (percentage)*		
Year	*World total*	*More developed regions*	*Less developed regions*	*World total*	*More developed regions*	*Less developed regions*
1900	1,650	573	1,077			
1910	1,775	650	1,125	0.7	1.3	0.4
1920	1,837	682	1,155	0.3	0.5	0.3
1930	2,044	759	1,285	1.1	1.1	1.1
1940	2,267	821	1,446	1.0	0.8	1.2
1950	2,506	857	1,649	0.9	0.4	1.2
1960	2,995	976	2,019	1.8	1.3	2.1
1970	3,621	1,084	2,537	1.9	1.1	2.3

SOURCE: United Nations Secretariat, Population Division, "Demographic trends in the world and its major regions, 1950-1970", *Population Debate*, vol. I, part two, table 1.

18. Between 1950 and 1970, it is estimated that the world population increased by 44 per cent. In the more developed parts of the world, the increase amounted to 26 per cent, while in the less developed regions of the world the population rose by 54 per cent. A breakdown by major areas show that the increase in Europe was by 17 per cent, in the Union of Soviet Socialist Republics by 35 per cent, in North America by 36 per cent and in East Asia by 38 per cent. In the less developed regions of the world, Africa increased its population by 60 per cent, South Asia by 59 per cent and Latin America by 73 per cent. The last-named three areas of the world and Oceania accounted for 43.6 per cent of the total world population in 1950 as against 48.8 per cent in 1970. [11]

19. Available evidence suggests that the remaining period of the present century will continue to experience accelerated growth in world population. More recent

[11] *Ibid.*, para. 8.

estimates of the demographic prospects by the United Nations suggests that between 1970 and the year 2000, the world population may rise from 3,621 million to 6,407 million Of the totals indicated, the share of the less developed regions of the world is expected to rise from about 2,537 million in 1970 to 5,039 million by the year 2000 The annual rates of growth in the less developed regions is expected to decrease only slightly from 2 4 per cent in 1970 to 2.1 per cent in the year 2000 as against 0 9 per cent for 1970 and 0 6 per cent in the developed regions by the end of the century [12]

20 Assuming that fertility in every major area of the world will eventually be reduced to the replacement level during the twenty-first century, the more developed parts of the world will, on the basis of United Nations medium variant assumption, stabilize at about 1 9 thousand million That of the less developed regions is expected to grow up to 10 5 thousand million by the year 2125 Available evidence thus points to a continued widening gap in the size of population of the developed and less developed areas of the world beyond the year 2000 [14]

21 The accelerated growth rate of the world population may be alternatively assessed by considering the doubling-time Information available suggests that between 1650 and 1750, the doubling-time of the world population was approximately 231 years Between 1850 and 1900, the annual growth rate had reduced the doubling-time to 116 years From 1930 to 1940, with an estimated growth rate of 1 per cent per annum, the doubling-time was approximately 69 years By 1960, the time had been reduced to about 38 years The current doubling-time for the global population is between 30 and 35 years [14] In the case of developing countries, the doubling-time in 1950 was about 58 years and in 1960, 34 years By 1970, *the population of the developing* regions of the world was doubling every 30 years

22 However, analysis of global momentum of population growth must be considered against the background of country changes The growth incidence has been far from uniform Accelerated growth rates were first encountered in those countries which earlier experienced the process of modernization These changes included revolutions in agricultural techniques, commerce, industry, science and technology The basis of the modern economy of affluent societies began earlier in Europe and America and did not have a decisive impact on the remaining two thirds of mankind in Asia, Latin America and Africa until after the Second World War [15]

23 Gunnar Myrdal has estimated that on the basis of the current two-thirds share of the total world population, the changing population trend is likely to result in a population of approximately four fifths for the developing countries by the end of the century [16] He further advanced the view that by that time, the population of developed countries is expected to move towards a stationary condition, while that of developing countries is expected to grow further, possibly resulting in a total population of from 10 thousand million to 15 thousand million, and probably more These figures, though largely estimated, underline the importance of the developing world in the growing population problem Table 2 shows the percentage of distribution by the more developed and less developed regions and of major areas of the world, 1970-2125, on the basis of the United Nations medium-variant projection

[12] United Nations Secretariat, Population Division "World and regional population prospects", *Population Debate*, vol I, part two, table 1

[13] *Ibid* paras 64-66

[14] Philip M Hauser, "World population—retrospect and prospect", in National Academy of Sciences, *Rapid Population Growth—Consequences and Policy Implications* (Baltimore Maryland, Johns Hopkins Press, 1971), vol II, pp 103 105

[15] *Ibid*

[16] Gunnar Myrdal "Economics of an improved environment" *International Technical Co-operation Centre Review* (Tel Aviv) vol II, No 2(6) (April 1973), p 29

TABLE 2 POPULATION PROJECTION BY THE MORE DEVELOPED AND LESS DEVELOPED REGIONS AND OF MAJOR AREAS OF THE WORLD 1970 2125 MEDIUM VARIANT

(Percentage)

Area	*1970*	*2000*	*2025*	*2050*	*2075*	*2100*	*2125*
World total	100 0	100 0	100 0	100 0	100 0	100 0	100 0
More developed regions	29 9	21 3	16 7	14 1	13 0	12 8	12 8
Less developed regions	70 1	78 7	83 3	85 9	87 0	87 2	87 2
Africa	9 7	13 0	15 9	18 1	19 5	19 9	19 9
Latin America	7 8	9 9	10 6	10 9	10 8	10 7	10 7
Northern America	6 3	4 6	3 7	3 1	2 8	2 8	2 8
East Asia	25 6	21 4	18 2	15 9	14 7	14 5	14 5
South Asia	30 7	37 2	40 6	42 8	43 6	43 7	43.7
Europe	12 7	8 4	6 4	5 3	4 9	4 8	4 8
Oceania	0 5	0 5	0 5	0 4	0 4	0 4	0 4
USSR	6 7	5 0	4 1	3 5	3 3	3 2	3 2

SOURCE United Nations Secretariat, Population Division "World and regional population prospects", *Population Debate*, vol I, part two table 9

24. A closer study of the changing trends in human numbers indicates that in what are now the more developed parts of the world, accelerated growth was a feature of the nineteenth century. The more recent years have shown a slowing-down. However, in the less developed parts of the world, a combination of high death rate and disruptive events kept the rate of population increase at a low level in the last century. The sharp upward trend in developing countries dates back to the early 1950s. In these regions, the dramatic impact of accumulated medical discoveries and public health measures was very much delayed by the economic conditions and wars until after 1945. Death rates have been reduced more rapidly, while birth rates have changed little. [17]

25. Future prospects according to the United Nations medium-variant projection suggests that the approximate doubling-time of the population in Europe will rise from about 100 years in the period 1970-1975 to 116 years in the period between 1995 and the year 2000 (table 3). Similarly, in North America, the doubling-time will increase from 54 years in 1970-1975 to 70 years in 1995-2000, while that of the USSR will change from 70 years to 88 years over the same period. East Asia will rise from 41 years to 63 years during the same span.

TABLE 3. POPULATION PROSPECTS: APPROXIMATE DOUBLING-TIME PERIOD, BY REGION, 1970-2000

(Years)

Region	1970-1975	1980-1985	1995-2000
East Asia	41	47	63
South Asia	25	25	35
Europe	100	100	116
USSR	70	58	88
Africa	25	23	25
North America	54	47	70
Latin America	24	25	25
Oceania	33	32	44
World	35	35	41

26. Among the least developed regions of the world, South Asia will experience a change in the doubling-time from 25 years in 1970-1975 to 35 years in 1995-2000, while the time span in Africa and Latin America will remain about 25 years. Over the same period, the doubling-time of the world population will change from 35 years in 1970-1975 to 41 years over the period 1995-2000.

27. However, conditions within the two less developed regions, Africa and Latin America, differ considerably. United Nations medium-variant projections indicate that between 1970 and 1975 the doubling-time for the major Africa regions ranged from 22 years in Northern Africa to 26 years in Western and Easter Africa. Middle Africa and Southern Africa wer doubling their populations in 29 and 28 years, respec tively. In Latin America, Tropical South America an Middle America were doubling their populations in 2 years and 21 years, while the Caribbean, with doubling-time of 32 years, was also increasing its popu lation rapidly. In Temperate South America, the dou bling time was 41 years.

28. For the period 1995 to 2000, the doubling-tim of most of the major regions of Africa is expected t range from about 24 to 28 years. Western Africa an Middle Africa will be doubling their populations ever 25 years, while the populations of Eastern Africa and Northern Africa will be doubling every 24 and 26 years respectively. In Southern Africa, the doubling is expected to remain the same at 28 years. The high rate of population growth characteristic of Africa will also be experienced in Latin America, where the doubling-time for most of the regions, excluding Temperate South America, will still be between 23 and 33 years. It is only in Temperate South America that an improvement to 50 years is expected by the period 1995-2000.

29. However, even the regional and subregional growth rates conceal major differences among countries and within countries. Recent census results in East Africa suggest growth rates well in excess of the average given by the medium-variant projection. In 1969, the Uganda census adjusted for immigration suggested a natural rate of increase of 3.2 per cent at the end of the 1959-1969 decade. [18] Analysis for the United Republic of Tanzania similarly suggests a growth rate in excess of 3.0 per cent per annum by 1980. [19] In Kenya, the 1962 census indicated that the African population was increasing at the rate of 3.0 per cent per annum. The census in August 1969 indicated a national growth rate of 3.3 per cent per annum and a rate for the African population estimated at 3.5 per cent per annum. [20] Analysis of the major ethnic groups in Kenya indicated rates far in excess of the average of 3.5 per cent for the African population. It is increases of the above-cited nature that strengthens the forecast of continued acceleration of population growth of the less developed countries well into the twenty-first century.

30. This paper has so far dealt with the rate of population growth primarily because it is one of the most often discussed aspects by those who propose a drastic reduction of fertility as a measure of control of the population inflation. However, there are other

[17] United Nations Secretariat, Population Division, "Demographic trends in the world and its major regions, 1950-1970", *loc. cit.*, para. 5.

[18] S. Taber, "The Uganda census, provisional results", in S. H. Ominde and C. N. Ejiogu, eds., *Population Growth and Economic Development* (London, Heinemann, 1972), pp. 41-48.

[19] B. Egero, "Population characteristics of Tanzania", in S. H. Ominde and C. N. Ejiogu, eds., *Population Growth and Economic Development*, pp. 14-20.

[20] S. H. Ominde, "Rural/urban problems of the African environment", paper prepared for the United Nations Economic Commission for Africa, Regional Seminar on the Human Environment, Addis Ababa, 23-27 August 1971.

features of population change which are aggravated by the high rate of population growth. The most important of these are structural changes and spatial redistribution of population.

31. Among the most significant changes has been the age composition, which greatly affects social and economic activities. In the more developed parts of the world, the proportion of persons aged 0-14 years has shown a marked decrease since 1950, while in the developing countries there has been an increase.[21] Table 4 summarizes the changes that have been experienced by the three main functional groups. In developing countries of the world, future years will witness a sharp rise in the proportion of dependent population in response to sustained fertility and falling mortality rates. These changes will be accompanied by increasing pressure on world opportunities, social facilities and services.

32. Among the most important changes in the population of developing countries is spatial redistribution and in particular the accelerating tempo of urbanization. Urbanization has been described as the crisis problem of the 1970s.[22] In the affluent parts of the world, the tendency has been to describe urbanization as mankind's environmental disruption, while among the developing countries it has been considered within the context of underdevelopment. The first attention of the United Nations Development Decade was very much directed to the underdevelopment aspect of urbanization leading to deterioration of urban areas. In the Second Develop-

[21] United Nations Secretariat, Population Division, "Demographic trends in the world and its major regions, 1950 1970", *loc. cit.*, table 8.

[22] N. Honjo, "Urbanization in Africa", *International Technical Co-operation Centre Review* (Tel Aviv), vol. II, No. 2(6) (April 1973), pp. 67-80.

TABLE 4. PERCENTAGE COMPOSITION OF THE POPULATION BY THREE BROAD AGE GROUPS, IN MAJOR AREAS AND REGIONS OF THE WORLD, 1950 AND 1970

	Percentage of 1950 population at ages			*Percentage of 1970 population at ages*		
Region	*0-14*	*15-64*	*65+*	*0-14*	*15-64*	*65+*
World total	*36.1*	*59.0*	*4.9*	*36.4*	*58.1*	*5.5*
More developed regions [a]	27.9	64.6	7.5	26.7	63.7	9.6
Less developed regions	40.5	56.0	3.5	40.6	55.6	3.8
Africa	*42.8*	*53.9*	*3.3*	*44.3*	*52.7*	*3.0*
Eastern Africa	43.1	53.6	3.3	45.2	51.6	3.2
Middle Africa	41.8	54.9	3.3	42.9	54.3	2.8
Northern Africa	42.3	54.2	3.5	44.4	52.5	3.1
Southern Africa	39.2	56.3	4.5	40.9	55.0	4.1
Western Africa	44.0	53.2	2.8	44.7	52.8	2.5
Latin America	*41.0*	*55.7*	*3.3*	*42.8*	*53.5*	*3.7*
Caribbean	39.9	56.2	3.9	41.8	53.5	4.7
Middle America	43.5	53.0	3.5	46.4	50.2	3.4
Temperate South America [a]	31.8	63.5	4.7	31.7	61.7	6.6
Tropical South America	42.9	54.3	2.8	44.0	53.0	3.0
Northern America [a]	*27.2*	*64.7*	*8.1*	*28.4*	*61.9*	*9.7*
East Asia	*38.8*	*57.0*	*4.2*	*33.6*	*61.0*	*5.4*
East Asia without Japan	39.2	56.8	4.0	34.9	59.9	5.2
Japan [a]	35.4	59.7	4.9	24.0	68.9	7.1
South Asia	*40.4*	*56.3*	*3.3*	*42.7*	*54.2*	*3.1*
Eastern South Asia	42.5	54.8	2.7	43.4	53.6	3.0
Middle South Asia	39.6	56.9	3.5	42.4	54.6	3.0
Western South Asia	40.6	56.1	3.3	43.1	53.2	3.7
Europe [a]	*25.4*	*65.1*	*9.5*	*24.9*	*63.7*	*11.4*
Eastern Europe [a]	26.7	66.3	7.0	24.6	65.0	10.4
Northern Europe [a]	23.5	66.2	10.3	24.2	63.1	12.7
Southern Europe [a]	27.8	64.8	7.4	24.3	65.9	9.8
Western Europe [a]	23.4	66.5	10.1	24.2	63.0	12.8
Oceania	*29.8*	*62.9*	*7.3*	*32.1*	*60.6*	*7.3*
Australia and New Zealand [a]	27.0	64.7	8.3	29.4	62.2	8.4
Melanesia	40.4	56.4	3.2	42.5	54.5	3.0
Micronesia and Polynesia	44.1	52.4	3.5	43.0	54.2	2.8
USSR [a]	*30.1*	*63.8*	*6.1*	*28.6*	*63.6*	*7.8*

SOURCE: United Nations Secretariat, Population Division, "Demographic trends in the world and its major regions, 1950 1970", *Population Debate*, vol. I, part two, table 8.

[a] More developed region.

ment Decade, concern with urbanization as an increasing characteristic of world population change has received a further impetus. This increasing attention on the characteristic trends is largely stimulated by the nature of urban growth rate at the global regional and national levels.

33. In 1950, the annual rate of growth of the urban population in the world was 3.4 per cent (table 5). By the year 2000 it is expected to fall slightly to 2.8 per cent. In the more developed parts of the world, the rate of urbanization is expected to decline from 2.8 per cent during the decade 1950-1960 to 1.4 per cent in the period 1990-2000. However, in the less developed parts of the world, the annual rate of urbanization is expected to rise from 4.3 per cent in the decade 1950-1960 to 4.6 per cent in 1960-1970.

TABLE 5. ANNUAL RATES OF GROWTH IN URBAN POPULATION, 1950-2000

(Percentage)

Region	*1950-1960*	*1960-1970*	*1970-1980*	*1980-1990*	*1990-2000*
World total	3.4	3.2	3.2	3.1	2.8
More developed regions	2.8	2.1	1.9	1.7	1.4
Less developed regions	4.3	4.6	4.5	4.2	3.7
East Asia	5.5	4.1	3.8	3.4	2.9
South Asia	3.3	4.4	4.5	4.2	3.6
Europe	1.7	1.7	1.5	1.4	1.2
USSR	4.1	2.7	2.3	2.1	1.7
Africa	4.7	4.7	5.0	5.0	4.7
Northern America	2.7	2.0	1.9	1.8	1.5
Latin America	4.6	4.4	4.2	3.9	3.5
Oceania	2.9	2.5	2.5	2.3	1.8

SOURCE: "Urban and rural population: individual countries, 1950-1985, and regions and major areas, 1950-2000" (ESA/P/WP.33/Rev.1), table 3.

34. By the year 2000, the rate is expected to decline to just under 4 per cent per annum.[23] Very high rates of urbanization are expected in Africa, Latin America and East and South Asia. In Africa, the annual rate of urban growth is expected to rise from 4.7 per cent during the 1950-1960 decade to 5.0 per cent over the 1970-1980 period. By the year 2000, the rate will be slightly less than 5 per cent per annum. The decreasing tempo of urbanization in the more developed continents is underlined by the fact that in Europe the decline is expected to be from 1.7 per cent to 1.2 per cent whereas in North America it will be from 2.7 to 1.5 per cent for the two decades.[24] Over the same period, the proportion of total urban population will rise from 28.3 per cent in 1950 to 51.1 per cent in the year 2000. Comparable figures suggest a rise of from 51.2 per cent in 1950 to 80.7 per cent in the year 2000 for the more developed regions of the world.

35. In the less developed parts of the world, the proportion of urban population will rise from a modest level of 16.3 per cent in 1950 to 42.6 per cent in the year 2000. This will represent an estimated increase of total urban population from 265 million in 1950 to 2,155 million by the year 2000 (table 6). Estimates for individual regions suggest that the urban proportion in East Asia will rise from 15.9 per cent to 50.7 per cent, South Asia from 15.9 per cent to 33.7 per cent, Africa 14.0 per cent to 39.2 per cent and Latin America 40.5 per cent to 75.9 per cent between 1950 and the year

TABLE 6. URBAN POPULATION BY MAJOR AREAS PROJECTED FOR EACH DECADE, 1950-2000

	Urban population (millions)	*Urban share of total population (percentage)*
World total		
1950	704	28.3
1960	985	33.0
1970	1,352	37.2
1980	1,854	41.5
1990	2,517	46.1
2000	3,329	51.1
More developed regions		
1950	439	51.2
1960	582	59.6
1970	717	65.7
1980	864	71.4
1990	1,021	76.4
2000	1,174	80.7
Less developed regions		
1950	265	16.3
1960	403	20.1
1970	635	25.0
1980	990	30.4
1990	1,496	36.3
2000	2,155	42.6

SOURCE: "Urban and rural population: individual countries, 1950-1985, and regions and major areas, 1950-2000" (ESA/P/WP.33/Rev.1), table 3.

[23] "Urban and rural population: individual countries, 1950-1985 and regions and major areas, 1950-2000" (ESA/P/WP.33/Rev.1), table 3.

[24] *Ibid.*

2000 [25] In the 30-year period from 1970 to 2000, the total urban population of the less developed regions of the world is expected to increase more than threefold Clearly, the need for houses, power systems, sanitation, schools, transport and other costly urban infrastructure will have to be expanded in relation to the pressure that is certain to develop

36 Some of the most acute environmental conditions in developing countries arise from the growing tendency of urban population to concentrate in a few large cities By 1960, it is estimated that 68 per cent of the total population in localities of 20,000 inhabitants or more were living in cities of 100,000 or more. Table 7 shows the extent to which the world's urban population is concentrated in cities with 1 million or more inhabitants By 1950, there were 75 cities having at least 1 million inhabitants [26] These constituted about a third of the world total In 1970, the number of such cities in developing countries constituted a little less than a half of the total for the world as a whole During the same interval the combined population of the "million-cities" increased from 174 million to 416 million In the more developed regions, the increase was from 126 million to 223 million However, in the less developed regions, the increase was from 48 million to 193 million The concentration of population in the "million-cities" has therefore been a more marked characteristic of the developing regions of the world [27]

37 Between 1950 and 1985, the annual compound growth rate for the old and new "million-cities" combined in the more developed regions is estimated at 2.9 per cent as against 6 7 per cent in the less developed regions Estimated growth rates of 5 4 and 7 1 per cent for East Asia and South Asia respectively, 9.3 per cent for Africa and 6 1 per cent for Latin America underline the problem of the large city growth in developing regions of the world in the Second United Nations Development Decade. [28]

38 Over the same period, the population of the "million-cities" in East Asia is expected to increase from 31 4 million to 195 2 million, in South Asia from 15 0 million to 165 8 million, in Africa from 3 4 million to 46 8 million and in Latin America from 15 3 million to 120 8 million

39 But total figures for individual continents and countries conceal the acute problems associated with the phenomenal growth of individual cities In India, the cities of Calcutta and Bombay, which in 1950 had populations of 4 1 million and 2 7 million, respectively, by 1970 had reached 6 9 million and 5 8 million each. In 1985, the two giant cities are expected to top the 12 million mark each Delhi, which in 1950 had 1.3 million, is expected to have a population of 3 5 million in 1970 and 8 5 million in 1985 [29]

40 In Africa, between 1970 and 1985, Lagos is expected to increase its population almost fivefold, Ibadan threefold, Accra twofold, and Addis Ababa, Nairobi and Kinshasa threefold In Northern Africa, Casablanca and Algiers are expected to double their populations In Southern Africa, Johannesburg, Cape Town and Durban, which had reached the million threshold by 1970, are also expected at least to double their populations

41 In Latin America, the giant cities of São Paulo and Rio de Janeiro are expected to increase their populations from 7 8 million and 6 8 million each to 16 8 million and 11 4 million, respectively, by 1985 Lima-

[25] *Ibid*

[26] United Nations Secretariat, Population Division "Demographic trends in the world and its major regions 1950 1970", *loc cit*, para 49

[27] *Ibid*

[28] "The world's million cities, 1950-1985" (ESA/P/WP 45), para 20

[29] *Ibid*, table 13

TABLE 7 NUMBER OF CITIES HAVING AT LEAST ONE MILLION INHABITANTS, POPULATION OF THESE CITIES AND PERCENTAGE OF URBAN POPULATION CONTAINED IN CITIES, THE WORLD AND EIGHT MAJOR REGIONS 1950 AND 1970

	Number of million-cities		*Population in million-cities (millions)*		*Percentage of urban population in million-cities*	
	1950	*1970*	*1950*	*1970*	*1950*	*1970*
World total	*75*	*162*	*173 9*	*416 2*	*25*	*31*
More developed regions	51	83	126 2	223 5	29	32
Less developed regions	24	79	47 6	192 8	19	29
South Asia	8	27	15 0	63 1	13	26
East Asia	13	36	31 4	100 9	31	37
Europe	28	36	60 2	86 3	29	30
Africa	2	8	3 4	15 6	11	20
USSR	2	10	7 5	21 1	10	15
North America	14	27	38 1	71 2	36	42
Latin America	6	16	15 3	52 9	23	33
Oceania	2	2	3 0	5 1	38	39

SOURCE United Nations Secretariat, Population Division, "Demographic trends in the world and its major regions, 1950-1970", *Population Debate*, vol I, part two, table 15.

Callao in Peru will double its population between 1970 and 1985. Mexico, with a population of 2.9 million in 1950, is expected to double its population from 8.3 million in 1970 to 17.9 million in 1985.

Environmental consequences of population growth in developing countries

42. The fact that the unprecedented rapid population increase in developing countries, which is going on and may well proceed for decades and certainly for more than a generation, places a heavy impediment in the way of development needs no emphasis. Population increase is the vital factor in environmental problems. Natural resources have to be considered in relation to the size of the population which has to be provided for. Pollution in its various forms in the rural and urban areas is clearly a function of density of population. Developing countries are thus caught up in the dilemma of lack of development and adverse effects of modern development. The Prime Minister of India, addressing the plenary session of the United Nations Conference on the Human Environment in Stockholm, had this to say:

> "Are not poverty and need the greatest polluters? For instance, unless we are in a position to provide employment and purchasing power for the daily necessities of the tribal people and those who live in or around our jungles, we cannot prevent them from combing the forest for food and livelihood; from poaching and from despoiling vegetation .... The environment cannot be improved in conditions of poverty. Nor can poverty be eradicated without the use of science and technology." [30]

43. Among the areas that are hit hardest are the social services, such as health and education. The Director-General of the World Health Organization, in addressing the Human Environment Conference, warned of "the dangers created by polluted drinking water and low levels of housing and sanitation" in developing countries. He estimated that 80 per cent of the world population is faced with these kinds of problems rather than with the consequence of industrialization.

44. Food production is a field in which the developing countries are particularly vulnerable. Technology in these areas is either lacking or is insufficiently developed to protect the population from the vagaries of the physical environment. Whether it is the exceptional drought or the excesses of floods, the periodic crises which face millions of people in the less developed parts of the world are a serious reminder of the dangers of uncontrolled population growth. The observation of the Director-General of the Food and Agriculture Organization of the United Nations is worth recalling:

> "There will be twice as many people on our planet in the year 2000, twice as many mouths to feed. Most of this increase will occur in the developing, already under-nourished and over-populated parts of the world. To meet their requirements, agricultural production should be doubled every 18 years—a rate never achieved over a sustained period by the countries that are now well fed." [31]

45. Lack of education is an indirect factor in environmental deterioration. Many well-conceived programmes of development have foundered on the rock of ignorance. In this respect, it is important to note that with increasing population and inability of Governments to provide for more than a bare minimum, the problem of illiteracy will be on the increase. Education is central to development and the consequence of education being scarce in the face of environmental challenges is already a fundamental issue in developing countries.

46. The rural populations of developing countries are among the most poorly housed. Most countries have concentrated on housing policies that favour the urban dwellers. However, in countries of the world where well over 80 per cent of the population live in rural areas, the problem of providing a decent shelter for the rural population is a crisis that cannot be ignored by development programmes. Accelerated population growth, particularly of rural populations, will intensify the difficulties of developing countries in achieving the objectives of improved rural housing.

47. The problems considered so far are those which arise from the lack of development in developing countries. They are the problems that afflict those parts of the world where lack of capital resources continue to hamper development and where the trained manpower gap constitutes a real bottle-neck to implementation of development programmes. However, those problems arising from existing development policies which are responsible for serious environmental problems are now considered. These problems arise from the nature of agricultural transformation in developing countries, industrialization including the basic problem of location and the rural-urban exodus.

48. While industrialization remains the goal of developing countries of the world, the development of agriculture, the mainstay of the vast majority of the population, remains a major priority area. However, lack of agricultural jobs means that the gap between the demand for jobs and employment opportunities is very wide. With increasing population it means that labour in the agricultural sector is frequently underemployed. At times of drought, the entire labour force in agriculture may be idle.

49. Agriculture in developing countries faces the twin demand for creating more gainful employment and preventing a decrease in *per capita* income and hence increasing poverty. With an increasing density of popu-

[30] Indira Ghandi, "Life is one and the world is one", in *Environment Stockholm* (United Nations publication, Geneva, 1972), p. 18.

[31] "If we do not accept hunger . . .", speech by the Director-General of the Food and Agriculture Organization of the United Nations to the United Nations Conference on the Human Environment, Stockholm, June 1972, in *Environment Stockholm, loc. cit.*, p. 18.

lation, these problems become more intractable The objective of agriculture must be to sustain a high employment target But opportunities must also be found to absorb the increasing population by finding work opportunities outside agriculture

50 However, the most obvious problem of environmental impact arises from the effort to raise productivity in response to new demands on agriculture through the application of technology There are such new hazards as the application of chemical weed control and the increasing use of insecticides whose environmental impacts have not been adequately studied For some time, the application of irrigation technology has been advocated as a means to fuller utilization of available agricultural potential. On the other hand, it is becoming clear that for irrigation technology to pay, there is a minimum below which productivity cannot fall Even the "green revolution" does not appear to have provided the solution to the problem of increasing work opportunities on the land

51 Industrialization enjoys a high priority as a means to counteracting the persistent poverty and lack of development that prevails in developing countries However, there are problems of industrial location to be considered Some developing countries that are hard-pressed by population problems have been prone to accept industrialization which more developed countries are in the process of correcting The danger is that faced with the urgency of providing employment opportunities for the rising labour force, developing countries may fail to apply the safeguards essential for preservation of the quality of the environment.

52. Analysis of the global, regional and national context of the problem of urban explosion in developing countries underlines the dangers of environmental disruption and an undesirable effect on human living The unplanned urban growth and associated sanitary problems, the increasing difficulties being experienced in providing houses and other essential urban facilities are now well known among development planners in the less developed parts of the world It has been stressed that these problems will intensify in response to the pattern of growth outlined However, the concentration on the physical aspects of environmental disruption tends to minimize the psycho-social impact of the new, phenomenal urban growth The need to adjust the totally new and at times unintegrated communities underlies some mental maladjustment that is now attracting the attention of health authorities

Possibilities that technology offers

53. Developing countries of the world see in urbanization an instrument for spreading development to other less developed parts of the national territory It is for this reason that urban centres as growth poles figure prominently in the physical development plans of some countries But the concept of growth poles is based on the view that urbanization in an essential condition for reducing the poverty gap between regions and among the various sections of the national community It is based on the conviction that planned use of modern technology can mitigate the undesirable aspects of urbanization trends in the developing world Planning technology is based on the conviction that an alternative settlement pattern is a feasible solution to environmental deterioration

54 However, the concentration on the urban aspects of population change may lead to an undue emphasis on the urban end of the population problem The spread of urban development is certainly a means of bringing technology to serve a rural community previously denied access to the urban services However, some decisive action must be taken to arrest the excessive rates of population growth

55 The traditional approach to the problem advocated had been to attack the biological causes of the population explosion through a widespread adoption of contraceptives However, as Barry Commoner has argued, such an approach has failed to bring about a significant reduction in human fertility in the less developed regions of the world [12] The general conclusion is that the desired demographic transition which is conducive to improved living conditions and to the preservation of environmental quality requires a far more complex approach and the application of technology which would influence peoples' choice of families However, implicit in the analysis of the paper is the view that the developing countries are faced by a problem that is already there and by the prospects of further deterioration in the situation in the near future

56 The technology of fertility control which has enabled the more developed parts of the world to devote increasing resources to development needs is clearly there It must be made available to the population of developing regions as an inseparable part of the development strategy in the current state of the demographic evolution of the regions concerned But it is essential that there be a determined attack on the sociological factors that underlie the continuing preference for large families, especially the desire for survival and security in old age

57. Problems of poverty and lack of development are far more complex Their solution in the more developed parts of the world has involved not merely the application of technology, but in a very specific way the overhaul of the institutional framework The state of environmental deterioration and persistent lack of development has a human dimension and it is the capacity of the institutional framework to adapt to available technology that will determine the success of remedial measures whether applied globally, regionally or nationally.

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[12] Barry Commoner "Survival in the environmental population crisis", in S F. Singer, ed , *Is There an Optimum Level of Population?* (New York, McGraw Hill 1971), pp 96-113

HUMAN POPULATION AND THE GLOBAL ENVIRONMENT*

*Paul R. Ehrlich*** *and John P. Holdren****

1. Three dangerous fallacies appear to be widespread among decision-makers and others with responsibilities related to population growth, environmental deterioration and resource depletion. The first is that the absolute size and rate of growth of the human population has little or no relationship to the rapidly escalating ecological problems facing mankind. The second is that environmental deterioration consists primarily of "pollution", which is perceived as a local and reversible phenomenon of concern mainly for its obvious and immediate effects on human health. The third fallacy is that science and technology can overcome all problems arising from the scale and rate of growth of consumption of natural resources.

2. The authors, and many others, have dealt at length with the third fallacy elsewhere.[1] This paper demonstrates that population size and the rate of population growth, in both developed and developing countries, are important factors in producing environmental deterioration. Further, it is asserted that such deterioration is a much more subtle, pervasive and dangerous phenomenon than is implied by the simplistic view of "pollution" alluded to above.[2]

3. Environmental problems can be classified according to the nature of the damage to human beings, as follows:

(*a*) Direct assaults on human welfare, including obvious damage to health (for example, lead poisoning or aggravation of lung disease by air pollution); damage to goods and services (for example, the corrosive effects of air pollution on buildings and crops); social disruption (for example, displacement of people from their living areas by mining operations and hydroelectric projects); and other direct effects on what people perceive as their "quality of life" (for example, congestion, noise and litter);

(*b*) Indirect effects on human welfare through interference with services provided for society by natural biological systems (for example, diminution of ocean productivity by filling estuaries and polluting coastal waters and acceleration of erosion by logging or overgrazing).

4. Most of the attention devoted to environmental matters by scientists, politicians and the public has been focused on the direct effects and, more particularly, on their acute rather than their chronic manifestations. This is only natural. It would be wrong, however, to interpret limited legislative and technical progress towards ameliorating the direct, acute symptoms of environmental damage as evidence that society is on its way to an orderly resolution of its environmental problems. The problem is not merely that the discovery, implementation and enforcement of treatment for those obvious symptoms is likely to be expensive and difficult. Unfortunately, the long-term human consequences of chronic exposure to low concentrations of environmental contaminants may be more serious—and the causes less amenable to detection and removal—than those of acute pollution as it is perceived today.

5. The most serious threats of all, however, may well prove to be the indirect ones generated by mankind's disruption of the functioning of the natural environment—the second category listed above, which is now discussed. The topic is developed in the following steps. First, the relevance of environmental disruption to human welfare is established by examining the services provided for society by nature. Then, some historical examples of ecological disruption caused by human activities are given, followed by an examination of the role of contemporary civilization as an ecological force. Against this background, the role of demographic variables—population size, growth rate and geographical distribution—in generating ecological problems is considered. A discussion of time factors relevant to ecological problems emphasizes growth rates, sources of momentum in the factors generating the problems, the

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[1] National Academy of Science, *Resources and Man* (San Francisco, W. H. Freeman and Co., 1969); Paul R. Ehrlich and John P. Holdren, "Population and panaceas—a technological perspective", *BioScience*, vol. 12 (December 1969), pp. 1065-1071; Preston R. Cloud, "Mineral resources in fact and fancy", in William W. Murdoch, ed., *Environment: Resources, Pollution and Society* (Stamford, Conn., Sinauer Associates, 1971), pp. 71-88; John P. Holdren, "Energy: resources and consumption", in John P. Holdren and Philip Herrera, *Energy* (New York, Sierra Club Books, 1971), pp. 14-155; T. S. Lovering, "Non-fuel mineral resources in the next century", in John P. Holdren and Paul R. Ehrlich, eds., *Global Ecology* (New York, Harcourt Brace Jovanovich, 1971), pp. 39-53.

[2] For a lengthy development of the simplistic view, see John Maddox, *The Doomsday Syndrome* (New York, McGraw-Hill Book Company, 1972).

possibility of irreversible environmental damage and the issue of imminence—the reasons for believing that serious ecological impact on the welfare of civilization will be felt sooner rather than later

Natural resources

6 The most obvious services provided for humanity by the natural environment have to do with food production The fertility of the soil is maintained by the plants, animals and micro-organisms that participate in the great nutrient cycles—nitrogen, phosphorus, carbon and surphur Soil itself is produced from plant debris and weathered rock by the joint action of bacteria, fungi, worms, soil mites and insects The best protection against erosion of soil and flooding is natural vegetation

7 At many stages of the natural processes comprising the nutrient cycles, organisms accomplish what humans have not yet learned to do—the complete conversion of wastes into resources, with solar energy captured by photosynthesis as the driving energy source Human society depends upon these natural processes to recycle many of its own wastes, from sewage to detergent to industrial effluents. (Reflect on the term "biodegradable") In the course of the same cycles, the atmospheric concentrations of ammonia, carbon monoxide and hydrogen sulphide—all poisonous—are biologically controlled [3]

8 Insects pollinate most vegetables, fruits and berries Most fish—the source of from 10 to 15 per cent of the animal protein consumed by mankind [4]—are produced in the natural marine environment, unregulated by man (As is well known, animal protein is the nutrient in shortest supply in a chronically undernourished world) Most potential crop pests—one competent estimate is 99 per cent—are held in check not by man, but by their natural enemies and by characteristics of the physical environment, such as temperature, moisture and availability of breeding sites [5] Similarly, some agents of human disease are controlled principally not by medical technology, but by environmental conditions, and some carriers of such agents are controlled by a combination of environmental conditions and natural enemies [6]

9. Lastly, the natural environment in its diversity can be viewed as a unique library of genetic information New food crops, new drugs and vaccines and new biological pest controls can be drawn from this library. The loss of a species, or even a loss of genetic diversity within a species, is the loss forever of a potential opportunity to improve human welfare.

10 These "public-service" functions of the global environment cannot be replaced by technology now or in the foreseeable future In some cases, this is so because the process by which the service is provided is not understood scientifically and in other cases, because no technological equivalent for the natural process has yet been devised But in the largest number of cases, the sheer size of the tasks simply dwarfs civilization's capacity to finance, produce and deploy new technology. The day is far away when food for billions will be grown on synthetic nutrients in greenhouses free of pests and plant diseases, when the wastes of civilization will be recycled entirely by technological means and when all mankind will live in surroundings as sterile and as thoroughly managed as those of an Apollo space capsule Until that improbable future arrives—and it may never come—the services provided by the orderly operation of natural biological processes will continue to be irreplaceable as well as indispensable

History of human ecological disruption

11 Ecological disruption on a large scale by human beings is not a new phenomenon Even before the advent of agriculture, man as a hunter is thought to have contributed to a reduction in the number of species of large mammals inhabiting the earth [7] Much more significant, however, was the era of abuse of soils and habitat that was initiated by the agricultural revolution about 10,000 years ago and has continued up to the present

12 One of the best-known early examples is the conversion to desert of the lush Tigris and Euphrates valleys, through erosion and salt accumulation resulting from faulty irrigation practices [8] In essence, the downfall of the great Mesopotamian civilization appears to have been the result of an "eco-catastrophe" Overgrazing and poor cultivation practices have contributed over the millennia to the expansion of the Great Sahara Desert, a process that continues today, [9] and the Rajasthan Desert in India is also believed to be in part a product of human carelessness and population pressure. [10]

[3] Institute of Ecology, *Man in the Living Environment* (Madison, University of Wisconsin Press, 1972).

[4] Georg Borgstrom, *The Hungry Planet* (New York, Collier Books, 1967), S J Holt, "The food resources of the ocean", *Scientific American* September 1969

[5] *Man's Impact on the Global Environment Assessment and Recommendations for Action*, report of the Study of Critical Environmental Problems (SCEP) (Cambridge, Mass, Massachusetts Institute of Technology Press, 1970), p 123

[6] Jacques M May, "Influence of environmental transformation in changing the map of disease", in M Taghi Farvar and John P. Milton, eds, *The Careless Technology Ecology and International Development* (Garden City, N Y, The Natural History Press, 1972)

[7] P S Martin and T E Wright, Jr, eds, *Pleistocene Extinctions The Search for a Cause* (New Haven, Conn, Yale University Press, 1957)

[8] Thorkild Jacobsen and Robert M Adams, "Salt and silt in ancient Mesopotamian agriculture", *Science*, vol 128 (1958), pp 1251-1258

[9] M Kassas, "Desertification versus potential for recovery in circum Saharan territories", in *Arid Lands in Transition* (Washington, D C, American Association for the Advancement of Science, 1970)

[10] B R, Seshachar, "Problems of environment in India", in *Inte*[illegible] of a joint coll[illegible] of the United Stat[illegible]merce, House of [illegible] Astronautics (W[illegible] 1971)

13. Much of Europe and Asia were deforested by pre-industrial men, beginning in the Stone Age; heavy erosion, recurrent flooding and the nearly permanent loss of a valuable resource were the result. [11] Overgrazing by the sheep of Navajo herdsmen has destroyed large tracts of once prime pasture in the South-western area of the United States of America. [12] Attempts to cultivate too intensively the fragile soils of tropical rain-forest areas are suspected of being at least in part responsible for the collapse of the Mayan civilization in Central America and that of the Khmers in what is today the Khmer Republic. [13] (The famous temples at Angkor Wat were built in part of laterite, the rock-like material that results when certain tropical soils are exposed to the air through cultivation.)

14. The practice of agriculture—even where quality of soils, erosion or salt accumulation do not pose problems—may encounter ecological difficulties. The most basic one is that agriculture is a simplifier of ecosystems, replacing complex natural biological communities with relatively simple man-made ones based on a few strains of crops. Being less complex, agricultural communities tend to be less stable than their natural counterparts; they are vulnerable to invasions by weeds, insect pests and plant diseases, and they are particularly sensitive to extremes of weather and variations in climate. Historically, man has attempted to defend his agricultural communities against the instabilities to which they are susceptible by means of vigilance and the application of "energy subsidies"—for example, hoeing weeds and, more recently, applying pesticides and fungicides. He has not always been successful. The Irish potato famine of the nineteenth century is, perhaps, the best-known example of the collapse of a simple agricultural ecosystem. The heavy reliance of the Irish population on a single, highly productive crop led to 1.5 million deaths when the potato monoculture fell victim to a fungus. [14] To put it another way, the carrying capacity of Ireland was reduced, and the Irish population crashed.

Contemporary man as an ecological force

Agriculture

15. Advances in agricultural technology in the past 100 years have not resolved the ecological dilemma of agriculture; they have aggravated it. The dilemma can be summarized this way: civilization tries to manage ecosystems in such a way as to maximize productivity; [15] "nature" manages ecosystems in such a way as to maximize stability; and the two goals are incompatible. Ecological succession proceeds in the direction of increasing complexity. Ecological research has shown that the most complex (and stable) natural ecosystems tend to have the smallest net community productivity; less complex, transitional ecosystems have higher net community productivity; and the highest net community productivities are achieved in the artificially simplified agricultural ecosystems of man (see table 1). In short, productivity is achieved at the expense of stability.

Table 1. Productivity of various ecosystems

(Kilocalories of energy per square metre per annum)

Ecosystem	*Net primary productivity*	*Net community productivity*
Alfalfa field	15,200	14,400
Pine forest	5,000	2,000
Tropical rain-forest	13,000	Little or none
Long Island Sound	2,500	Little or none

Source: Eugene P. Odum, *Fundamentals of Ecology*, 3rd ed. (Philadelphia, Saunders, 1971), p. 46.

Note: Some ecologists use grams of dry organic matter or grams of carbon in place of kilocalories. There are about 4 kilocalories of available bond energy per gram of dry organic matter, or 10 kilocalories per gram of contained carbon. The average human being metabolizes 2,500 kilocalories per day.

16. Of course, mankind would have to practise agriculture to support even a fraction of the existing human population. A tendency towards instability in agricultural ecosystems must be accepted and, where possible, compensated for by technology. However, the trends in modern agriculture—associated in part with the urgent need to cope with unprecedented population growth and in part with the desire to maximize yields per acre for strictly economic reasons—are especially worrisome ecologically. There are four major liabilities:

(*a*) As larger and larger land areas are given over to farming, the unexploited tracts available to serve as reservoirs of species diversity and to carry out the "public-service" functions of natural ecosystems become smaller and fewer. (World land-use patterns are summarized in table 2.);

(*b*) Pressure to expand the area under agriculture is leading to destructive attempts to cultivate land that is actually unsuited for cultivation with the technologies at hand. Thus, the expansion of agriculture to steep hillsides has led to serious erosion in Indonesia, [16] the increasing pressure of slash-and-burn techniques is destroying tropical forests in the Philippines, [17] and

[11] H. C. Darby, "The clearing of the woodland in Europe", in William L. Thomas, Jr., ed., *Man's Role in Changing the Face of the Earth* (Chicago, University of Chicago Press, 1956), p. 183.

[12] Carl O. Sauer, "The agency of man on earth", in William L. Thomas, Jr., ed., *Man's Role in Changing the Face of the Earth*, *loc. cit.*, p. 60.

[13] Jeremy A. Sabloff, "The collapse of classic Maya civilization", in John Harte and Robert Socolow, eds., *Patient Earth* (New York, Holt Rinehart and Winston, 1971), p. 16.

[14] G. L. Carefoot and E. R. Sprott, *Famine on the Wind: Man's Battle Against Plant Disease* (Chicago, Illinois, Rand McNally, 1967).

[15] Readers unfamiliar with the terminology and principles of ecology should read the annex before proceeding with this section.

[16] Albert Ravenholt, "Man-land-productivity microdynamics in rural Bali", in Harrison Brown and others, eds., *Population: Perspective, 1973* (San Francisco, Freeman-Cooper, 1973), in press.

[17] Albert Ravenholt, "The Philippines", in Harrison Brown and Alan Sweezy, eds., *Population: Perspective, 1971* (San Francisco, Freeman-Cooper, 1971), pp. 247-266.

attempts to apply the techniques of temperate-zone agriculture to the tropical soils of Brazil and southern Sudan have led to erosion, loss of nutrients and laterization.[18] Over-logging of tropical forests has had similar effects,

(c) Even in parts of the world where land area under agriculture is constant or (for economic reasons) dwindling, attempts to maximize yields per acre have led to dramatic increases in the use of pesticides and inorganic fertilizers, which have far-reaching ecological consequences,[19]

(d) The quest for high yields has led also to the replacement of a wide variety of traditional crop varieties all over the world with a few, specially bred, high-yield strains Unprecedented areas are now planted to a single variety of wheat or rice This enormous expansion of monoculture has increased the probability and the potential magnitude of epidemic crop failure from insects or disease.[20]

Effects of pollution on ecosystems

17 The expansion and intensification of agriculture has been accompanied by a continuing industrial revolution that has multiplied many times over both the magnitude and variety of the substances introduced into the biological environment by man It is useful to classify these substances as "qualitative pollutant[s] (synthetic substances produced and released only b[y] man) and "quantitative pollutants" (substances natural[ly] present in the environment, but released in significa[nt] additional quantities by man)

18 Well-known qualitative pollutants are the chlor[i]nated hydrocarbon pesticides, such as DDT, the relat[ed] class of industrial chemicals called PCBs (polychlorin[a]ted biphenyls) and some herbicides These substanc[es] are biologically active in the sense of stimulati[ng] physiological changes, but since organisms have had n[o] experience with them over evolutionary time, the sub[-]stances are usually not easily biodegradable[21] Thu[s] they may persist in the environment for years an[d] decades after being introduced, and be transporte[d] around the globe by wind and water[22] Their long-ter[m] effects will be discovered only by experience, but the[ir] potential for disruption of ecosystems is enormous

19 Within the category of quantitative pollutant[s] there are three criteria by which a contribution made b[y] mankind may be judged significant

(a) Man can perturb a natural cycle with a lar[ge] amount of a substance ordinarily considered innocuou[s] either by overloading part of the cycle (as is done i[n] the denitrifying part of the nitrogen cycle when o[ne] over-fertilizes, leading to the accumulation of nitrate[s] and nitrites in ground water,[24] by destabilizing a finel[y]

[18] Mary McNeil, "Lateritic soils in distinct tropical environments southern Sudan and Brazil", in M Taghi Farvar and John P Milton, eds, *The Careless Technology Ecology and International Development* (Garden City, N Y, The Natural History Press, 1972), pp 591-608, Daniel Janzen, "The unexploited tropics", *Bulletin of the Ecological Society of America*, September 1970, pp 4-7

[19] M W Miller and G G Berg, eds, *Chemical Fallout Current Research on Persistent Pesticides* (Springfield, Illinois, Charles C Thomas, 1969); Institute of Ecology, *op cit*, John Phillips, "Problems in the use of chemical fertilizers", in M Taghi Farvar and John P Milton, eds, *The Careless Technology, loc cit*, pp 549-556

[20] O H Frankel and others, "Genetic dangers in the green revolution", *Ceres*, vol 2, No 5 (September October 1969), pp 35-37; O H Frankel and E Bennett, eds, *Genetic Resources in Plants—Their Exploration and Conservation* (Philadelphia, F A Davis Co, 1970) For a more recent popular summary, see Michael Allaby, "Miracle rice and miracle locusts", *Ecologist* (May 1973), pp 180-185

[21] C F Wurster, 'Chlorinated hydrocarbon insecticides a[nd] the world ecosystem", *Biological Conservation* vol 3 (1972) pp 123-129

[22] See R W Risebrough and others, "Pesticides transa[t]lantic movements in the northeast trades", *Science*, vol 1[59] (1968), pp 1233-1236, G M Woodwell, P P Craig a[nd] H A Johnson "DDT in the biosphere where does it go?" *Science*, vol 174 (1971), pp 1101-1107, L Cory, P Fie[ld] and W Serat, "Distribution patterns of DDT residues in t[he] Sierra Nevada mountains', *Pesticides Monitoring Journa[l]* vol 3 (1970), pp 204-211

[23] See, for example, Paul R Ehrlich, Anne H Ehrlich a[nd] John P Holdren, *Human Ecology Problems and Solutio[ns]* (San Francisco, W. H Freeman and Co, 1973), chap. 6, a[nd] Charles F Wurster, "DDT reduces photo synthesis by mari[ne] phytoplankton", *Science* 29 March 1968, pp 1474 1475

[24] D R Keeney and W R Gardner, "The dynamics [of] nitrogen transformations in the soil", in S F Singer, ed

(Continued on next pa[ge])

TABLE 2 WORLD LAND USE, 1966

(Millions of square kilometres)

	Total	*Tilled*	*Pasture*	*Forest*	*Other*[a]
Europe	4 9	1 5	0 9	1 4	1.1
USSR	22 4	2 3	3 7	9 1	7 3
Asia	27 8	4 5	4 5	5 2	13 7
Africa	30 2	2 3	7 0	6 0	15 0
North America	22 4	2 6	3 7	8 2	7.9
South America	17 8	0 8	4 1	9 4	3.5
Oceania	8 5	0 4	4 6	0 8	2 7
TOTAL[b]	134 2	14 3	23 6	40 2	51.2
Percentage	100	10 6	21 3	29 9	38 2

SOURCE Georg Borgstrom, *Too Many* (New York, Macmillan, 1969), p 290

[a] Deserts, wasteland, built-on land, glaciers, wetlands.

[b] Excluding Antarctica

tuned balance (as is done to the global atmospheric heat engine, which governs global climate, by adding CO^2 to the atmosphere through combustion of fossil fuels [25]); or by swamping a natural cycle completely (as could happen to the climatic balance in the very long term from man's input of waste heat [26]);

(*b*) An amount of material negligible compared with natural global flows of the same substance can cause great damage if released in a sensitive spot, over a small area or suddenly (for example, the destruction of coral reefs in Hawaii by silt washed from construction sites);

(*c*) Any addition of a substance that can be harmful even at its naturally occurring concentrations must be considered significant. Some radio-active substances fall into this category, as does mercury.

20. The most general effect of pollution of all kinds on ecosystems is the loss of structure or complexity. [27] Specifically, food chains are shortened by pollution through the selective loss of the chief predators. This is so because compared with herbivores predators are more sensitive to environmental stresses of all kinds—pesticides, industrial effluents, thermal stress and oxygen deficiency. This increased sensitivity results from several mechanisms: the predator populations are usually smaller than those of the prey species, so the predator populations tend to have a smaller reservoir of genetic variability and, hence, less probability of evolving a resistant strain; top predators are often exposed to higher concentrations of toxic substances than organisms at lower trophic levels, owing to the phenomenon of biological concentration of pollutants as they move up the food chain; and, lastly, the direct effects of pollution on predators are compounded by the fact that pollutants may reduce the size of the prey population to the point where the predator population cannot be supported. Loss of structure may also occur at lower trophic levels when, for a variety of reasons, one species of herbivore or lower carnivore proves especially sensitive to a particular form of environmental stress. One does not have to eradicate the food web from top to bottom for significant differential effects to occur.

21. The adverse effects of loss of structure on the "public-service" functions performed by ecosystems are varied and serious. The vulnerable chief predators in marine ecosystems are generally the food fishes most highly prized by man. The loss of predators on land releases checks on herbivorous pests that compete with man for his supply of staple crops. Damaging population outbreaks of these pests—the classic "instability"—are the result. (A good example is the experience with pesticides and cotton pests in the Canete Valley in Peru. [28]) The loss of structure of ecosystems also increases the load on the aquatic food webs of decay, which are already heavily stressed by the burden of mankind's domestic and agricultural wastes. The resulting overload precipitates a vicious progression: oxygen depletion; a shift from aerobic to less efficient anaerobic bacterial metabolism; the accumulation of organic matter; and the release of methane and hydrogen sulphide gas. [29]

Vulnerability of the sea

22. The ocean, currently indispensable as a source of animal protein, may be the most vulnerable ecosystem of all. Its vast bulk is deceiving. The great proportion of the ocean's productivity—over 99 per cent—takes place beneath 10 per cent of its surface area; and half of the productivity is concentrated in coastal upwellings amounting to only 0.1 per cent of the surface area. [30] The reason is that productivity requires nutrients, which are most abundant near the bottom of the sea, and sunlight, available only near the top. Only in the coastal-shelf areas and in upwellings are nutrients and sunlight both available in the same place.

23. The coastal regions, of course, also receive most of the impact of man's activities—oil spills, fall-out from atmospheric pollutants generated on the adjacent land and river out-flow bearing pesticide and fertilizer residues, heavy metals and industrial chemicals. Almost perversely, the most fertile and critical components of all in the ocean ecosystem are the estuaries into which the rivers empty; estuaries serve as residence, passage or nursery for about 90 per cent of commercially important fish. [31] To compound the problem of pollution, the salt-marshes that are an integral part of estuarine biological communities are being routinely destroyed by landfill operations.

24. Over-fishing is almost certainly also taking a heavy toll in the ocean, although it is difficult to separate its effect from that of pollution and destruction of the estuarine breeding grounds and nurseries. The combined result of these factors is clear, however, even if the blame cannot be accurately apportioned. Since the Second World War, the catches of the East Asian sardine, the California sardine, the North-west Pacific salmon, the Scandinavian herring and the Barents Sea cod (among others) have entered declines from which there has been no sign of recovery. [32]

25. Current, world fisheries production of somewhat over 60 million metric tons is already more than half

Global Effects of Environmental Pollution (New York, Springer Verlag, 1970), pp. 96-103.

[25] *Inadvertent Climate Modification*, report of the Study on Man's Impact on Climate (SMIC) (Cambridge, Mass., Massachusetts Institute of Technology Press, 1971).

[26] John P. Holdren, "Global thermal pollution", in John P. Holdren and Paul R. Ehrlich, eds., *Global Ecology* (New York, Harcourt Brace Jovanovich, 1971).

[27] G. M. Woodwell, "Effects of pollution on the structure and physiology of ecosystems", *Science*, vol. 168 (1970), pp. 429-433.

[28] Teodoro Boza Barducci, "Ecological consequences of pesticides used for the control of cotton insects in Canete Valley, Peru", in M. Taghi Farvar and John P. Milton, eds., *The Careless Technology: Ecology and International Development* (Garden City, N.Y., The Natural History Press, 1972), pp. 423-438.

[29] G. M. Woodwell, *loc. cit.*

[30] John H. Ryther, "Photosynthesis and fish production in the sea", *Science*, vol. 166 (1969), pp. 72-76.

[31] *Man's Impact on the Global Environment: Assessment and Recommendations for Action*, p. 148.

[32] Institute of Ecology, *op. cit.*, p. 33.

of the 100 million that some marine biologists[33] consider to be the maximum sustainable yield. But recent interruptions in the pattern of continuously increasing yields since the Second World War,[34] declining catches per unit effort and increasing international friction over fishing rights[35] make it seem unlikely that theoretical maximum yields will even be approached

Flows of material and energy

26 Many people still imagine that mankind is a puny force in the global scale of things They are persuaded, perhaps by the vast empty spaces visible from any jet airliner in many parts of the world, that talk of global ecological disruption is a preposterous exaggeration. The question of the absolute scale of man's impact, however, is amenable to quantitative investigation Natural global flows of energy and materials can be reasonably calculated or estimated, providing an absolute yardstick against which to measure the impact of human activities

27 The results are not reassuring As a global geological and biological force, the activities of mankind [illegible] comparable to and even exceeding [illegible]

ping operations and refinery wastes exceeded the global input from natural seepage by an estimated twenty-fold[36] The minimum estimate for 1980, assuming all foreseeable precautions, is 30 times natural seepage.[37] Civilization is now contributing half as much as nature to the global atmospheric sulphur burden, and will be contributing as much as nature by the year 2000[38] In industrial areas, civilization's input of sulphur (as sulphur dioxide) so overwhelms natural removal processes that increased atmospheric concentrations and acidic surface-water are found from hundreds to thousands of kilometres down wind[39] Combustion of fossil fuels has increased the global atmospheric concentration of carbon dioxide by 10 per cent since the turn of the century[40] Civilization's contribution to the global atmospheric burden of particulate matter is uncertain, estimates range from 5 to 45 per cent of total annual input[41] Roughly 5 per cent of all the energy captured by photosynthesis on earth flows through the agricultural ecosystems supporting the metabolic consumption of human beings and their domestic animals—a few out of some millions of species[42] The rates at which mankind is mobilizing critical nutrients and many metals (including the most toxics ones) considerably exceeds the basic geological mobilization rates as estimated from river flows[43] (see table 3) Such figures as these do not prove that disaster is imminent, but, combined with the ecological perspective summarized above, they are cause for uneasiness In terms of the scale of its disruptions, m'nkind is, for the first time, operating on a level at which global balances could hinge on human mistakes

TABLE 3 MANKIND'S MOBILIZATION OF MATERIALS

(Thousands of metric tons per annum)

Element	*Geological rate (river flow)*	*Man's rate (mining and consumption)*
Iron	25,000	319,000
Nitrogen	3,500	19,800
Copper	375	4,460
Zinc	370	3,930
Nickel	300	358
Lead	180	2,330
Phosphorus	180	6,500
Mercury	3	7
Tin	1 5	166

SOURCE *Man's Impact on the Global Environment Assessment and Recommendations for Action*, report of the Study of Critical Environmental Problems (Cambridge, Mass, Massachusetts Institute of Technology Press, 1970)

28 Some of the forms of disruption described above are, of course, amenable in principle to elimination or drastic reduction through changes in technology Discharges of oil, sulphur dioxide and carbon dioxide, for example, could be greatly reduced by switching to energy sources other than fossil fuels In the case of these pollutants, then, the questions involve not whether the disruptions can be managed, but whether they will be, whether the measures will come in time, and what social, economic and new environmental penalties will accompany those measures At least one environmental problem is intractable in a more absolute sense, however, and that is the discharge of waste heat accompanying all of civilization's use of energy What is referred to here is not simply the well-publicized thermal pollution at the s tes of electric generating plants, but to the fact that all the energy used—as well as that wasted in generating electricity—ultimately arrives in the environment as waste heat This phenomenon may be understood qualitatively by considering the heat from a light-bulb, the heat from a running motor-car engine and the heat in the exhaust, the heat from friction of tyres against pavement and metal against air or the heat

[33] John H Ryther, *loc cit.*

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[37] *Ibid*

[38] W W Kellogg and others, "The sulfur cycle", *Science*, vol 175 (1972), p 587

[39] Gene E Likens, F Herbert Bormann and Noye M Johnson, "Acid rain", *Environment* (March 1972), p 33

[40] *Man's Impact on the Global Environment Assessment and Recommendations for Action*, loc cit, p 49

[41] *Inadvertent Climate Modification* pp 188-192

[42] George M Woodwell, "The energy cycle of the biosphere", *Scientific American*, September 1970

[43] *Man's Impact on the Global Environment Assessment and Recommendations for Action*, loc. cit, p 116

from the oxidation of iron to rust—to name a few examples. Quantitatively, the ultimate conversion of all the energy used to heat (most of this occurring near the point of use and almost immediately) is required by the laws of thermodynamics; the phenomenon cannot be averted by technological tricks.

29. The usual concern with local thermal pollution at power-plants is that the waste heat, which is usually discharged in to water, will adversely affect aquatic life. By contrast, most of the waste heat from civilization's energy use as a whole is discharged directly into the atmosphere, and the concern is disruption of climate. Again, it is instructive to compare the scale of human activities with that of the corresponding natural processes, in this case the natural energy flows that govern climate. One finds that the heat production resulting from (and numerically equal to) civilization's use of energy is not yet a significant fraction of the solar energy incident at the earth's surface on a global average basis (see table 4); even if the current 5 per cent per annum rate of increase of global energy use persists, it will take another century before civilization is discharging heat equivalent to 1 per cent of incident solar energy at the surface world-wide.[44]

TABLE 4. ENERGY FLOWS

(Thousand millions of thermal kilowatts)

(1)	Civilization's 1970 rate of energy use	7
(2)	Global photosynthesis	80
(3)	15 thousand million people at 10 thermal kilowatts per person	150
(4)	Winds and ocean currents	370
(5)	Poleward heat flux at 40° north latitude	5,300
(6)	Solar energy incident at earth's surface	116,000

SOURCES: For (1), *Statistical Yearbook, 1971* (United Nations publication, Sales No. E/F.72.XVII.1); for (2), George M. Woodwell, "The energy cycle of the biosphere", *Scientific American*, September 1970; for (4) and (6), M. King Hubbert, "Energy resources", in William Murdoch, ed., *Environment* (Stamford, Conn., Sinauer Associates, 1971); for (5), William D. Sellers, *Physical Climatology* (Chicago, University of Chicago Press, 1965), p. 67.

30. Considerably sooner, however, as indicated in table 4, mankind's heat production could become a significant fraction of smaller natural energy transfers that play a major role in the determination of regional and continental climate (e.g., the kinetic energy of winds and ocean currents, and the poleward heat fluxes). It is especially important in this connexion that civilization's heat production is, and will continue to be, very unevenly distributed geographically. Human heat-production already exceeds 5 per cent of incident solar radiation at the surface over local areas of tens of thousands of square kilometres, and will exceed this level over areas of millions of square kilometres by the year 2000, if current trends persist.[45] Such figures could imply substantial climatic disruptions. In addition to the effects of its discharge of heat, civilization has the potential to disrupt climate through its additions of carbon dioxide and particulate matter to the atmosphere, through large-scale alteration of the heat-transfer and moisture-transfer properties of the surface (e.g., agriculture, oil films on the ocean and urbanization), through cloud formation arising from aircraft contrails, and, of course, through the combined action of several or all of these disruptions.

31. Much uncertainty exists concerning the character and imminence of inadvertent climate modification through these various possibilities. It is known that a global warming of a few degrees Centigrade would melt the ice-caps and raise the sea level by 50 metres, submerging coastal plains and cities. A few degrees in the opposite direction would initiate a new ice-age. Although such global warming or cooling is certainly possible in principle, a more complicated alteration of climatic patterns seems a more probable and perhaps more imminent consequence of the very unevenly distributed impacts of civilization's use of energy. It is particularly important to note that the consequences of climatic alteration reside not in any direct sensitivity of humans to moderate changes in temperature or moisture, but rather in the great sensitivity of food production to such changes[46] and, perhaps, in the possible climate-related spread of diseases to populations with no resistance to them.[47]

32. The effect of climate on agriculture was once again being dramatically demonstrated in early 1973. Because of "bad weather", famine was widespread in sub-Saharan Africa, and was beginning in India. South East Asia had small rice harvests, parts of Latin America were short of food and crops were threatened in the Union of Soviet Socialist Republics and in the United States of America.[48] Another year of monsoon failure in the tropics and inclement weather in the temperate zones, and the human death rate will climb precipitously. Over-population is dramatically demonstrated in mankind's inability to store sufficient carry-over food-supplies in anticipation of the climatic events which are a regular feature of the earth.

THE ROLE OF POPULATION

33. This section takes up the most critical aspect of the problem with respect to the current World Population Conference: the way in which and the extent to which population variables contribute to ecological problems.

[44] John P. Holdren, "Global thermal pollution", *loc. cit.*

[45] *Inadvertent Climate Modification, loc. cit.*, pp. 55-60.

[46] Sherwood B. Idso, "Potential effects of global temperature change on agriculture", in W. H. Matthews, F. E. Smith and E. D. Goldberg, *Man's Impact on Terrestial and Oceanic Ecosystems* (Cambridge, Mass., Massachusetts Institute of Technology Press, 1971), p. 184.

[47] Jacques M. May, *loc. cit.*, p. 184.

[48] The situation is serious enough to attract considerable attention in the media. See, for instance, "United Nations signals red alert for possible famine in 28 countries", *Palo Alto Times*, 8 June 1973, p. 25.

Multiplicative effect

34 The most elementary relation between population and environmental deterioration is that population size acts as a multiplier of the activities, consumption and attendant environmental damages associated with each individual in the population The contributing factors in at least some kinds of environmental problems can be usefully studied by expressing the population/environment relation as an equation environmental disruption = population × consumption per person × damage per unit of consumption [49]

35 Since the consumption of goods or services per person is a measure of affluence, and since environmental damage per unit of goods or services consumed depends in part upon the character of the technology used, the foregoing equation has sometimes been abbreviated as "pollution equals population times affluence times technology". Needless to say, the numerical quantities that appear in such an equation will vary greatly, depending upon the problem under scrutiny Different forms of consumption and technology are relevant to each of the many forms of environmental disruption The population factor may refer to the population of a city, a region, a country or the world, depending upon the problem being considered (This point, of course, raises the issue of population distribution) The equation, therefore, represents not one calculation, but many.

36 For problems described by multiplicative relations like the one just given, no factor can be considered unimportant. The consequences of the growth of each factor are amplified in proportion to the size and rate of growth of each of the other factors. Rising consumption per person has greater impact in a large population than in a small one—and greater impact in a growing population than in a stationary one. A given environmentally disruptive technology, such as the petrol-powered motor-car, is more damaging in a large, rich population (many people own motor-cars and drive them often) than in a small, poor country (few people own motor-cars, and those who do drive them less) A given level of total consumption (population times consumption per person) is more damaging if it is provided by means of a disruptive technology, such as persistent pesticides, than if provided by means of a relatively non-disruptive one, such as integrated pest control

37 Quantitatively, the important point is that when slowly growing factors multiply each other, they lead to rapidly growing products. Consider the following example in which there are two multiplicative factors rather than three Suppose one wishes to know whether population growth or rising consumption *per capita* played a greater role in the growth of total energy consumption in the United States of America between 1880 and 1966 In this period, total energy consumption increased about twelvefold, and the population increased fourfold [50] It may therefore appear that consumption *per capita* was a more important factor than population growth. It was not Consumption *per capita* increased threefold, *versus* fourfold for population. The twelvefold increase in the total consumption of energy arose as the product, not the sum, of the fourfold increase in population and the threefold increase in consumption *per capita*

38 The quantitative use of the population/environment equation with all three factors is also best illustrated by example Suppose one takes as an index of environmental impact the motor-car emissions of lead in the United States since the Second World War The appropriate measure of "consumption" is vehicle-miles per person, which increased twofold between 1946 and 1967 The impact per unit of consumption in this case is emissions of lead per vehicle-mile, which increased 83 per cent or 1 83 times in this period [51] Since the population of the United States increased 41 per cent, or 1 41 times between 1946 and 1967, one obtains

relative increase in lead emissions

$$= 1\ 41 \times 2\ 0 \times 1\ 83 = 5\ 16 \text{ or } 416 \text{ per cent}$$

Note that the dramatic increase in the total impact arose from rather moderate, but simultaneous, increases in the multiplicative contributing factors None of the factors was unimportant—if population had not grown in this period, the total increase would have been 3 66 times rather than 5 16 times (Contrast this result with the erroneous conclusion, arising from the assumption that the contributing factors are additive rather than multiplicative, that a 41 per cent increase in population "explains" only one tenth of a 416 per cent increase in emissions)

39 Calculations such as the foregoing can be made for a wide variety of pollutants, although it is frequently difficult to uncover the requisite data Where data are available, *the results show that the historical importance* of population growth as a multiplicative contributor to widely recognized environmental problems has been substantial [52]

40. Between 1950 and 1970, for example, world population increased by 46 per cent By regions, the figures were: Africa, 59 per cent, Asia, 52 per cent; Europe, 18 per cent, Latin America, 75 per cent; North America, 38 per cent; Oceania, 54 per cent, and the

[49] Paul R Ehrlich and John P Holdren, Impact of population growth *Science*, vol 171 (1971), pp 1212-1217

[50] United States of America, Department of Commerce, *Historical Statistics of the United States Colonial Times to 1956* (Washington, D C, Government Printing Office, 1960), and United States of America, Department of Commerce, *Statistical Abstract of the United States, 1972* (Washington, D C. Government Printing Office, 1972)

[51] Barry Commoner, "The environmental cost of economic growth", in *Population Resources and the Environment*, vol III of Commission research reports of the Commission on Population Growth and the American Future (Washington, D C, Government Printing Office, 1972), p 339

[52] Paul R Ehrlich and John P Holdren, "One-dimensional ecology" *Science and Public Affairs The Bulletin of the Atomic Scientists* (May 1972)

Soviet Union, 35 per cent.[53] On the assumption (which is shown below to be too simplistic) that the patterns of technological change and rising affluence *per capita* that were experienced in this period would have been the same in the absence of these population increases, one can conclude that the absolute magnitudes of damaging inputs to the environment in 1970 were greater by these same percentages than they would have been if population had remained at its 1950 level. Another way of saying this is that, under this simplistic assumption, the magnitude of damaging inputs to the global environment in 1970—a very large figure—would have been only 68 per cent as large if population had not grown between 1950 and 1970. (This follows from the relation: 1970 inputs in absence of population growth equal actual 1970 inputs times 1950 population divided by 1970 population.)

41. Not only has population growth been important in absolute terms as a contributor of environmental damage, but it has been important in relation to other sources of such damage. Perhaps the best way to illustrate this fact is with statistics for energy consumption per person, probably the best aggregate measure of both affluence and technological impact on the environment. One finds that energy consumption per person worldwide increased 57 per cent between 1950 and 1970.[54] By this measure, and under the simple assumption that population growth and trends in affluence and technology were independent, one finds that population growth in the period 1950-1970 was almost equal to the combined effect of rising affluence and technological change as a contributor of damaging inputs to the environment. (The comparison of population growth and energy consumption broken down by major geographical regions is given in table 5.) As is shown below, moreover, the effect of the simplistic assumption of independence of population and other factors is almost certainly to underestimate the role of population, not to over-estimate it.

TABLE 5. INCREASES IN POPULATION AND ENERGY CONSUMPTION *per capita* BETWEEN 1950 AND 1970, BY REGION

(Percentage)

Region	*Population*	*Energy per capita*
World	46	57
Africa	59	73
North America	38	43
Latin America	75	122
Asia	52	197
Europe	18	96
Oceania	54	54

SOURCE: *Statistical Yearbook, 1953* (United Nations publication, Sales No. 53.XVII.9) and *Statistical Yearbook, 1971* (United Nations publication, Sales No. E/F.72.XVII.1).

[53] *Statistical Yearbook, 1971* (United Nations publication, Sales No. E/F.72.XVII.1), p. 8.

[54] *Ibid.*, p. 44 and *Statistical Yearbook, 1953* (United Nations publication, Sales No. 53.XVII.9).

Non-linear effects

42. While it is useful to understand what proportion of the historical increase in specific environmental problems has been directly attributable to the multiplier effect of population growth, there is a more difficult and perhaps more important question than this historical/arithmetical one. Specifically, it may be asked to what extent non-linear effects cause a small increase in population to generate a disproportionately large increase in environmental disruption. These effects fall into two classes. First, population change may cause changes in consumption per person or in impact upon the environment per unit of consumption. Secondly, a small increase in impact upon the environment—generated in part by population change and in part by unrelated changes in the other multiplicative factors—may stimulate a disproportionately large environmental change.

43. An obvious example in the first category is the growth of suburbs in the United States at the expense of central cities, which has resulted in increased use of the motor-car. Another is the heavy environmental costs incurred in the form of large water projects when demand (population times demand per person) exceeds easily exploited local supplies. Yet another example is that of diminishing returns phenomena in agriculture, in which increases in yield needed to feed new mouths can be achieved only by disproportionate increases in inputs, such as fertilizer and pesticides.[55] In each case, the point is that the contributing factors in the population/environment relation can no longer be considered to be independent. In mathematical terms, the equation is non-linear.

44. Many phenomena that have the effect of generating disproportionate, or non-linear, consequences from a given change in demographic variables cannot easily be expressed in the framework of a single equation. One such class of problems involves technological change—the substitution of new materials or processes for old ones that provided the same types of material consumption. Obvious examples are the substitution of nylon and rayon for cotton and wool; of plastics for glass, wood and metals; of aluminium for steel and copper. Such substitutions may be rendered necessary by increasing total demand, or they may be motivated by other factors, such as durability and convenience. Substitutions or other technological changes that are motivated by the pressure of increased total demand, and lead to increases in environmental impact per unit of consumption, should be considered part of the environmental impact of population growth.

45. Environmental disruption is not, however, measured strictly by man's inputs to the environment—what man does to it. Equally important is how the environment responds to what is done to it. This re-

[55] David Pimentel and others, *Corn, Food and the Energy Crisis*, report 73-1 (Ithaca, New York, Cornell University Department of Entomology and Section of Ecology and Systematics, March 1973).

sponse itself is often non-linear; a small change in inputs may precipitate a dramatic response One example is the existence of thresholds in the response of individual organisms to poisons and other forms of "stress" Fish may be able to tolerate a 10° rise in water temperature without ill effect, whereas a 12° rise would be fatal. Carbon monoxide is fatal to human beings at high concentrations; but, as far as is known, causes only reversible effects at low concentrations Algal blooms in over-fertilized lakes and streams are examples of exceeding a threshold for the orderly cycling of nutrients in these biological systems

46 Another non-linear phenomenon, on the response side of environmental problems, involves the simultaneous action of two or more inputs. A disturbing example is the combined effect of DDT and oil spills in coastal waters DDT is not very soluble in sea-water, so the concentrations to which marine organisms are ordinarily exposed are small However, DDT is very soluble in oil Oil spills, therefore, have the effect of concentrating DDT in the surface layer of the ocean, where much of the oil remains and where many marine organisms spend part of their time.[56] These organisms are thus exposed to far higher concentrations of DDT than would otherwise be possible As a result of this mechanism, the combined effect of oil and DDT probably far exceeds their individual effects Many other synergisms in environmental systems are known or suspected: the interaction of sulphur dioxide and particulate matter in causing or aggravating lung disease;[57] the interaction of radiation exposure and smoking in causing lung cancer;[58] enhanced toxicity of chlorinated hydrocarbon pesticides when plasticizers are present.[59]

47 The exact role of population change varies considerably among the various forms of non-linear behaviour just described A non-linearity in the environment's response to growing total input—such as a threshold effect—increases the importance of all the multiplicative contributors to the input equally, regardless of whether population and the other contributors are causally related Some other forms of non-linearity, such as diminishing returns and certain substitutions, would occur eventually, whether or not population or consumption *per capita* increased For example, even a constant demand for copper that persisted for a long time would lead eventually to increasing expenditures of energy per pound of metal and to substitution of aluminium for copper in some applications In such instances, the role of population growth—and that of rising consumption *per capita*—is simply to accelerate the onset of diminishing returns and the need for technological change, leaving less time to deal with the problems created and increasing the chances of mistakes With regard to other phenomena, such as the effects of population concentration on certain forms of consumption and environmental impact, population change is clearly the sole and direct cause of the non-linearity (e g , additional transportation costs associated with suburbanization)

TIME FACTORS

Pattern of growth

48 All rational observers agree that no physical quantity can grow exponentially forever. This is true, for example, of population, the production of energy and other raw materials and the generation of wastes One may ask, however, whether there is anything about the 1970s—as opposed, for example, to the 1920s or 1870s—that should make this the decade in which limits to growth become apparent It should not be surprising that, when limits do appear, they will appear suddenly Such behaviour is typical of exponential growth If 20 doublings are possible before a limit is reached in an exponentially growing process (characterized by a fixed doubling-time if the growth rate is constant), then the system will be less than half "loaded" for the first 19 doublings—or for 95 per cent of the elapsed time between initiation of growth and exceeding the limit Clearly, a long history of exponential growth does not imply a long future

49 But the question must be asked where mankind stands in its allotment of doublings—whether mankind is notably closer to a limit now than 50 years ago Mankind is certainly moving more rapidly towards that limit The number of people added to the world population each year in the 1970s has been about twice what it was in the 1920s And, according to one of the better indices of aggregate environmental disruption, total energy consumption, the annual increase in man's impact on the environment (in absolute magnitude, not percentage) is 10 times larger now than then[60] It has been observed, moreover, that man is already a global ecological force, as measured against the yardstick of natural processes While the human population grows at a rate that would double its numbers in 35 years, ecological impact is growing much faster The Study of Critical Environmental Problems, sponsored by the Massachusetts Institute of Technology in 1970, estimates that civilization's demands upon the biological environment are increasing at about 5 per cent per annum, corresponding to a doubling-time of 14 years[61]

[56] Roger Revelle and others in W. H Matthews, F. E Smith and E D Goldberg, *Man's Impact on Terrestrial and Oceanic Ecosystems loc cit*

[57] *Cleaning Our Environment The Chemical Basis for* [illegible]

[59] E P. Lichtenstein and others, "Biological interaction between plasticizers and insecticides" *Journal of Economic Entomology*, vol 62, No 4 (August 1969), pp 761-765

[60] *Statistical Yearbook, 1971* (United Nations publication, Sales No E 72 XVII 1), and Joel Darmstadter and others, *Energy in the World Economy* (Baltimore, Johns Hopkins Press, 1971)

[61] *Man's Impact on the Global Environment Assessment and Recommendations, loc cit*, pp 118 119

Continuation of this rate implies a fourfold increase in demands on the environment between 1972 and the year 2000. It also implies that, if the environment were being stressed to half its capacity at the time of Earth Day in 1970 (which is not entirely implausible), then the "limit" would be reached by 1984. If the environment should be able to absorb as much as 32 times the 1970 level of damaging inputs, the limit would be reached by 2040, if the current rate persisted.

Momentum, time lags and irreversibility

50. The nature of exponential growth is such that limits can be approached with surprising suddenness. The likelihood of exceeding such a limit is increased by the momentum of human population growth, by the time delays between cause and effect in many environmental systems and by the fact that some kinds of damage are irreversible by the time they are visible.

51. Momentum can be thought of as the tendency of a system to continue in the direction it is already moving. The momentum of human population growth has its origins in deep-seated attitudes towards reproduction and in the age composition of the world population—37 per cent is under 15 years of age. This means there are far more young people who will soon be reproducing—adding to the population—than there are old people who will soon be dying—subtracting from it. Thus, even if the momentum in attitudes could miraculously be overcome overnight, so that every pair of parents in the world henceforth had only the number of children needed to replace themselves, the imbalance between young and old would cause population to grow from 50 to 70 years more before levelling off. [62] The growth rate would be falling during this period, but population would still climb 30 per cent or more during the transition to stability. Under extraordinarily optimistic assumptions about when replacement fertility might really become the world-wide norm, one concludes that world population will not stabilize below 8 thousand million people. [63]

52. The momentum of population growth manifests itself as a delay between the time when the need to stabilize population is perceived and the time when stabilization is actually accomplished. Forces that are perhaps even more firmly entrenched than those affecting population lend momentum to growth in *per capita* consumption of materials. These forces cause time lags similar to that of population growth in the inevitable transition to stabilized levels of consumption and technological reform. Time delays between the initiation of environmental insults and the appearance of the symptoms compound the predicament because they postpone recognition of the need for any corrective action.

53. Such environmental time delays come about in a variety of ways. Some substances persist in dangerous form long after they have been introduced into the environment (mercury, lead, DDT and its relatives and certain radio-active materials are obvious examples). They may be entering food webs from soil, water and marine sediments for years after being deposited there. The process of concentration from level to level in the food web takes more time. Increases in exposure to radiation may lead to increases in certain kinds of cancer only after decades and to genetic defects that first appear only in later generations. The consequences of having simplified an environmental system by inadvertently wiping out predators or by planting large areas to a single high-yield grain may not show up until just the right pest or plant disease comes along a few years later.

54. Unfortunately, time lags of these types usually mean that, when the symptoms finally appear, corrective action is ineffective or impossible. Species that have been eradicated cannot be restored. The radio-active debris of atmospheric bomb tests cannot be reconcentrated and isolated from the environment, nor can radiation exposure be undone. Soil that has been washed or blown away can be replaced by natural processes only on a time scale of centuries. If all use of persistent pesticides were stopped tomorrow, the concentrations of these substances in fish and fish-eating birds might continue to increase for some years to come.

Conclusions

55. The momentum of growth, the time delays between causes and effects and the irreversibility of many kinds of damage all increase the chances that mankind may temporarily exceed the carrying capacity of the biological environment. Scientific knowledge is not yet adequate to the task of defining that carrying capacity unambiguously, nor can one say with assurance how the consequences of exceeding the carrying capacity will manifest themselves. Agricultural failures on a large scale, dramatic loss of fisheries productivity and epidemic disease initiated by altered environmental conditions are among the possibilities. The evidence presented here concerning the current scale of man's ecological disruption and its rate of increase suggests that such possibilities exist within a time frame measured in decades, rather than centuries.

56. All of this is not to suggest that the situation is hopeless. The point is rather that the potential for grave damage is real and that prompt and vigorous action to avert or minimize the damage is necessary. Such action should include measures to slow the growth of the global population to zero as rapidly as possible. Success in this endeavour is a necessary, but not a sufficient condition for achieving a prosperous yet environmentally sustainable civilization. It will also be necessary to develop and implement programmes to alleviate political tensions, render nuclear war impossible, divert flows of resources and energy from wasteful

[62] Nathan Keyfitz, "On the momentum of population growth", *Demography*, vol. 8, No. 1 (February 1971), pp. 71-80.
[63] *Ibid.*

uses in rich countries to necessity-oriented uses in poor ones, reduce the environmental impact and increase the human benefits resulting from each pound of material and gallon of fuel, devise new energy sources, and, ultimately, stabilize civilization's annual through-put of materials and energy.[64]

57 There are, in short, no easy single-faceted solutions, and no component of the problem can be safely ignored. There is a temptation to "go slow" on population limitation because this component is politically sensitive and operationally difficult, but the temptation must be resisted The other approaches also pose problems, and they will be slow to be achieved. Ecological disaster will be difficult enough to avoid even if population limitation succeeds, if population growth proceeds unabated, the gains of improved technology and stabilized *per capita* consumption will be erased, and averting disaster will be impossible.

[64] The character and implementation of such measures is [illegible]

1971) Although most such proposals may seem impractical to politicians, they seem infinitely more practical to the authors than permitting the disasters that will result from inaction

ANNEX

Some elements of ecology

Energy flow and food chains

1 Energy is the currency of ecosystems The processes by which energy and mineral nutrients are passed through biological communities are described in terms of food chains light energy from the sun is captured and converted to chemical energy through photosynthesis in green plants, and then passed on in succession to herbivores, primary carnivores (eaters of herbivores), secondary carnivores (eaters of carnivores) and so on Each stage in a food chain is called a "trophic level" Organisms known as "decomposers" utilize the energy stored in dead plant and animal matter from all trophic levels and return mineral nutrients to the biosphere in forms usable by other organisms

2 Often the term "food web" is used in place of "food chain", since there are usually many species on each trophic level, and the food chains are interlaced, e g, most plant species are eaten by more than one species of herbivore, and many herbivores eat more than one species of plant Moreover, some organisms feed on several trophic levels at once—man is an herbivore when he eats bread, a primary carnivore when he eats beef and a secondary (or higher) carnivore when he eats fish

3 Plant communities are at the base of all food webs and thus the basis of all life on earth. The fundamental measure of performance of a plant community is the rate at which solar energy is captured by photosynthesis to be stored in chemical bonds In this context, "gross primary productivity" refers to the total rate of energy capture, "net primary productivity" is the total minus the rate at which captured energy is used to sustain the life processes of the plants themselves Thus, net primary productivity measures the rate at which energy is made available to the remainder of the food web Net community productivity is that which remains after the other organisms in the community have used part of the net primary productivity to sustain their own life processes. The net community productivity may be exported (for example, in the form of grain from a wheat field) or it may remain in the community in the form of an enlarged standing crop of plants and animals A community in balance may have no net community productivity at all—that is, the net primary productivity may be entirely burned up by the animals and micro-organisms within the community

4 A final, critical point concerning energy flow in ecosystems is that each step in a food chain results in the eventual loss (as heat) of a substantial fraction of the energy transferred A good rule of thumb for the loss is 90 per cent. This means it takes 10,000 kilocalories of corn to produce 1,000 kilocalories of steer, and, more generally, that available energy diminishes tenfold at each higher trophic level Thus, the food web is often described as an energy pyramid One consequence of this situation is that gains in production of animal protein come at high cost in primary calories Another is that the yield of prized food dishes, such as cod and tuna, is limited by their position on the fourth or fifth trophic level of the oceanic food web

Carrying capacity

5 Any population that multiplied as rapidly as the reproductive biology of the organism permitted would soon cover the earth This is prevented from occurring by deaths caused by such factors as predators, disease, scarcity of resources (e g, food, water, breeding sites) and many others What factor or combination o factors determines the size limit of a population varies from species to species, from place to place and from time to time The maximum size of the population that can be sustai ed at a given time (under a given set of environmental conditions) is described as the carrying capacity of the environment for that organism In this context, the word "sustain" implies an extended period Animal populations often temporarily exceed the carrying capacity of their environment—a phenomenon that is invariably followed by a population crash Human populations have shown this sort of behaviour [a]

Complexity and stability in ecosystems

6 The intricate interlacing of most biological food webs provides a form of insurance against some kinds of disruptions If one species of herbivore in a complex community is eradicated by disease or drought, the primary carnivores in the community may survive on other kinds of herbivores that are less susceptible to the disease If a population of predators dwindles for one reason or another, an outbreak of the prey species is unlikely if other kinds of predators are present to fill the gap Species diversity is one of a number of forms of biological complexity believed by many ecologists to impart stability to ecosystems

7 The question might be asked what is meant by "ecological stability" One definition is the ability of an ecosystem that has suffered an externally imposed disturbance to return to the conditions that preceded the disturbance, A more general

[a] Mary McNeil, "Lateritic soils in distinct tropical environments southern Sudan and Brazil", in M Taghi Farvar and John P Milton, *The Careless Technology Ecology and International Development* (Garden City, New York, Natural History Press, 1972), pp 591-608, and Daniel Janzen, "The unexploited tropics", *Bulletin of the Ecological Society of America*, September 1970, pp 4-7.

meaning is that a stable ecosystem resists large, rapid changes in the sizes of its constituent populations. Such changes (called fluctuations or instabilities, depending upon the circumstances) entail alteration of the orderly flow of energy and nutrients in the ecosystem. Usually, this will mean disruption of the "public-service" functions of the ecosystem, regardless of whether the instability is severe enough to cause any extinctions of species.

8. Stability is influenced by various kinds of complexities in various ways. Species diversity, previously mentioned, presumably imparts stability by providing alternative pathways for the flow of nutrients and energy through the ecosystem. Another possible advantage of a large number of species in a community is the existence of a few empty niches. (A niche is a biological role; and an empty niche is an opportunity for invasion by a new species outside the community, with possible disruptive effect.) Sheer number of species is not the only determining factor in this type of complexity, however; a degree of balance in population sizes among the species is also required if the capacity of the alternative pathways is to be adequate and the niches solidly occupied. [b] Measures of complexity exist at the population level of organization as well as that of the community. One is genetic variability, which provides the raw material for resistance against new threats. Another is physiological variability, in the form of a mixed age-distribution. (Here, the advantage of complexity manifests itself when threats appear that are specific to a particular stage in the organism's life cycle—say, a disease that strikes only juveniles.) There are other forms of complexity, as well, including physical complexity of habitat and variety in the geographical distribution of a given species.

9. The casual links between complexity and stability in ecological systems are by no means firmly established or well understood, and exceptions do exist. [c] The evidence of a general correlation between these properties is growing, however, and consists of theoretical considerations of the sort summarized above, general observations of actual ecosystems of widely varying complexity (the relatively simple ecosystem of the boreal coniferous forest—the "north woods"—is observed to be less stable than the complex tropical rain-forest) and a limited number of controlled laboratory and field experiments.

Time scales of ecological change

10. Ecological stability does not mean constancy or stagnation, and ecological change can take place over much longer time spans than the month-to-month or year-to-year time scale of fluctuations and instabilities. Ecological succession refers to the orderly replacement of one community in an area with other communities over periods often measured in decades. Evolution refers to changes in the genetic characteristics of species, brought about by natural selection over time periods ranging from a few generations to hundreds of millions of years. It is to be observed that, in terms of human beings, evolution is not the solution to pollution. When significant evolutionary change does take place on the short time scale of a few generations, it is necessarily at the expense of the lives of a large fraction of the population. [d]

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[b] To take an over-simplified example, consider two communities each containing 1 million organisms divided among 1,000 species. A situation with 1,000 populations of 1,000 individuals each should, all else being equal, be more stable than a situation where one population contains 900,100 individuals and the other 999 populations contain 100 individuals each.

[c] E. O. Wilson and W. A. Bossert, *A Primer of Population Biology* (Stamford, Conn., Sinauer Associates, 1971); Brookhaven National Laboratory, "Diversity and stability in ecological systems", *Brookhaven Symposia in Biology*, N.22, BNL 50175 C-56 (Upton, New York, Brookhaven National Laboratory, 1969).

[d] For more detailed discussion of ecological principles in relation to human problems, see Paul R. Ehrlich and Anne H. Ehrlich, *Population, Resources, Environment: Issues in Human Ecology* (San Francisco, W. H. Freeman and Co., 1972), especially chap. 7. Standard textbooks of ecology include: E. P. Odum, *Fundamentals of Ecology* (Philadelphia, W. B. Saunders Co., 1971); R. E. Ricklefs, *Ecology* (Newton, Mass., Chiron Press, 1973); and K. E. F. Watt, *Ecology and Resource Management* (New York, McGraw-Hill Book Co., 1968).

ENVIRONMENTAL DETERIORATION AND POPULATION *

World Health Organization

General considerations

Interaction between man and his environment

1. The health of a population largely depends on its socio-economic level [1] It also depends upon the environment, which comprises those external physical, chemical, biological and social influences that have a significant and detectable effect on the health and well-being of the individual or of communities of people

2 It has become increasingly clear in recent years that environmental degradation could result in serious and sometimes irreversible damage to life on this planet, if it is allowed to proceed unchecked

3. Poor sanitary conditions and the accompanying communicable diseases are the greatest causes of morbidity and mortality in the developing countries, where the majority of people live.

4. These conditions have been largely eliminated in the economically advanced countries, but other environmental hazards to health often exert their effects more subtly than do communicable diseases, and take their toll in the developing countries too. They include physical and chemical factors and psychosocial influences which, together with microbiological agents, make up the part of the ecosystem most directly affecting man's health

5. It is thus of fundamental importance to define and specify the nature and scope of the adverse effects of the environment. Unfortunately, the precise definition of such effects is not yet possible in many cases because of the complexity of the interrelationships between environmental factors and health, the lack of knowledge of many of the components involved and the influence of economic, political and cultural considerations.

6. Furthermore, man himself is a highly complex mechanism Faced with fluctuations in the external environment, he tends to maintain his internal balance within narrow limits This homoeostasis brings into play regulatory functions, such as thermo-regulation in the case of changes in external temperature These regulatory functions are closely interrelated. They are also linked to metabolic protective and cleansing processes which, to a certain extent, enable man to adapt to unfavourable changes in, or deterioration of the environment In other words, only in exceptional cases does man react directly and simply to stimuli from the environment; this is one of the basic causes of the difficulty and uncertainty of obtaining information concerning the effects of the environment on health

7 This interrelationship between responses is, moreover, bound up with two highly important features—adaptability and variability Adaptability is a characteristic of living things which enables them, in the short, medium and long term, to arrive at a new state of homoeostatic equilibrium in new circumstances Although limited, adaptability may, in terms of an entire population and under the selective influence of evolution, be reflected in genetic modifications It is linked with the very wide variations in man's biological, physiological and mental characteristics These variations appear both in an individual and within human groups, as well as between different human groups.

8 Each man is a unique being, and variations in an individual and between different individuals explain the great difficulties encountered in the elaboration of universally valid norms relating to environment and health

9 Lastly, psychosocial and cultural factors play a preponderant role in man, as compared with all other phenomena

Environment and health

10 These various considerations make it clear how difficult it is to determine precisely the harmful effects of environmental deterioration Assessment of these effects will vary according as an individual or a population is taken as the subject, and according to categories among the population concerned Work on the definition of more subtle health indicators than those of mortality, morbidity and fertility is only just beginning Sensitive indicators will probably have to be sought among the most vulnerable groups, such as children, the elderly and the physically or mentally handicapped.

11 As far as methodology is concerned, a dual approach is necessary. the epidemiological method, comprising the study of observable facts a [illegible] human

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* The original text of this paper (E/CONF 60/SYM III/17) was submitted to the Symposium on Population, Resources [illegible]

[illegible]

trends and prospects in relation to population and development", *Population Debate*, vol I, part four, J. B Bresler, ed, [illegible]

[illegible]

psychologie en milieu aride", *Recherches sur la zone aride XXII* (Paris, United Nations Educational, Scientific and Cultural Organization, 1963)

populations exposed to normal conditions, and the toxicological method, involving studies and tests on man and on animals, with all the uncertainty of extrapolating the results for which exposure conditions are controlled. These two approaches are complementary, but when they produce inconsistent conclusions, the epidemiological data should be accorded greater weight.

GENERAL ENVIRONMENTAL FACTORS

12. Certain general environmental factors may affect the health and well-being of entire populations, irrespective of their socio-economic level, although in most cases the socio-economic level interacts with them. Those of greatest importance are climatic, geographical, geological and hydrological factors and their direct or indirect effects on human groups.

13. These general factors require more thorough study, since their importance increases in direct relation to man's tendency to modify his environment.

14. The remarkable adaptability of the human species has enabled man to populate nearly all parts of the planet. The variety of climatic stresses has produced adjustments in physiology and behaviour, which are reflected in socio-cultural diversity. These socio-cultural variations have an important effect on the form and content of various kinds of mental illness. A number of psychiatric syndromes related to cultural phenomena have been observed. Through the study of these phenomena, the role of socio-cultural factors in man's adaptation to his environment can be understood. In addition to this socio-cultural diversity, morphological differentiation, which is often very clear-cut, also appears. For example, the Eskimo has a high ratio of body weight to surface area (greater than 39) in comparison with that of the nomad of the hot deserts (less than 33). Nevertheless, the relationships between these ecological gradients and health are imperfectly understood.

15. Dry heat in deserts, or humid heat in equatorial areas, is the most important climatic stress in terms of the number of individuals it affects. This factor places limitations on physical activity and indisputably plays an important role in hot countries.

16. In the long term, it is possible that hot climates increase the incidence of cardio-vascular illness and renal lithiases. "Tropical asthenia" has also been suggested, but there are insufficient epidemiological data to confirm the existence of this disorder.

17. Generally speaking, mortality tends to fall with the annual seasonal rise in temperature. However, sudden large rises in temperature result in increased mortality. The elderly and patients with heart disease (vulnerable groups) are particularly sensitive to sudden variations in temperature.

18. Seasonal variations appear to play an important role in the advent and development of certain mental diseases (e.g., affective psychoses) and psychosomatic disorders (e.g., gastric ulcers). With regard to behaviour, heat reduces alertness and may be the cause of a certain apathy and of accidents.

19. Cold climates have been shown to increase mortality and morbidity, in particular from diseases of the respiratory tract. It is also considered that cold may, when associated with humidity, promote rheumatic processes. The influence of cold on tuberculosis requires further clarification.

20. Extreme climatic conditions have a direct effect on the way of life and behaviour of social groups. Not only do these various conditions have a pathological effect, they also play a role in the organization of treatment services for, and in the rehabilitation of, the physically or mentally handicapped.

21. High altitude is a very special environment in which millions of people live who have adapted remarkably well, at the cost of profound and paradoxical physiological changes (e.g., pulmonary hypertension, reduction of blood, coronary and cerebral outputs, low arterial pressure). Arterial hypertension seems to be unknown and cardiac ischaemia appears to be very rare among those native to high altitudes. However, there seems to be a high incidence of congenital heart diseases and pulmonary oedema is found frequently.

22. The cost of adaptation in terms of health is little known, but it has been noted that populations of tropical regions who often have an abnormal type of haemoglobin (haemoglobin S, which promotes "resistance" to the dangerous forms of malaria) have been unable to settle in the high Andean areas because possession of this characteristic leads to serious blood disorders (splenic infarct) at a high altitude. Conversely, some populations living at very high altitudes, where there are few biological disease agents, seem unable to develop an adequate immune response when they move to the highly contaminated lowlands. These are two examples of ecological "traps".

23. Very many descriptions have been given of the effects of climate on different diseases, particularly respiratory conditions, cardio-vascular disorders and mental afflictions. While it is undeniable that some diseases are caused by climatic effects, the epidemiological data are still inadequate. Indirectly, climate, as one element of the ecological cycle, can have a very marked effect in promoting the development of parasites and microbes, thus keeping certain diseases endemic or helping to spread them epidemically.

24. Among general environmental factors, and excluding any artificial pollution, reports from various sources have shown an inverse statistical association between the hardness of drinking-water and the death rate from cardio-vascular diseases. The same correlation was reported in cities where the water had been artificially softened for a number of decades.

25. The effect of fluorides is also well known: an excess of fluorides can cause skeletal damage, while a lack of them can lead to a high incidence of dental caries. Iodine deficiency causes endemic goitre. Almost

all food can be contaminated naturally by aflatoxins, which have been reported as a carcinogen in certain population groups (liver cell carcinoma).

26 At the psychosocial level, the most important phenomenon is without doubt the change in socio-demographic structures

27 Overcrowding may affect the behaviour of animals, for example, by a decline in the adequacy of maternal behaviour, and may also affect physiological functions (for example, lethal dosages of drugs vary with the number of animals) In the case of human beings, there is a very clear correlation between, on the one hand, the different urban structures, an excessively high population density and socio-economic conditions; and, on the other hand, the incidence of mental disorders However, perhaps because of the complexity of these phenomena, no causal relationship has been established

28 Changes in socio-demographic structures are characterized by, *inter alia*, a change in family structure (from the extended family to the nuclear family) and have a very important effect not only on physical and mental pathology, but on the organization of health services The disappearance of traditional forms of social behaviour reduces the community's capacity for dealing with its sick or infirm members Rapid socio-economic development and population expansion have led to an unbalanced age structure. In many parts of the world, there has been an unprecedented increase in the vulnerable groups (children and old people), which has not been accompanied by a proportionate increase in personnel able to provide medical, social and educational services

Characteristics peculiar to the more industrialized countries

29 In economically and technically advanced countries, the factors causing health problems whose magnitude and gravity cannot easily be circumscribed are, at the biological level, the various kinds of physical and chemical pollution of the environment and, at the psychosocial level, the special life-styles and kinds of work resulting from industrialization Although the effect on health of the major hazardous agents in the environment is relatively well known in the case of occupational exposure or in serious accidents (generally involving exposure for a very limited number of times and for a very limited period to high doses), the individual or combined effect of chronic, low-level exposure to these or other agents on large population groups is, apart from a few exceptions, very little known, if not completely unknown The same is true of the collective effects of the different kinds of stress in modern life

30 In the case of air pollution, the three dramatic episodes in the Meuse valley in France (1930), the Donora valley in Pennsylvania, United States of America (1948) and London (1952) provided the main evidence that, in extreme cases, air pollution could be a direct and important cause of morbidity and mortality

31. Only in the London episode was it possible to demonstrate that an increase in mortality and the presence of smoke and sulphur dioxide coincided with a dense cold fog which lasted for four days The excess mortality and the increase in morbidity occurred mainly among persons suffering from bronchitis and, to a lesser degree, among those suffering from coronary or myocardial disease (See table 1.)

TABLE 1. INCREASE IN MORTALITY IN THE LONDON FOG OF DECEMBER 1952[a]

Cause of death	*Seasonal norm (deaths per week)*	*Deaths in week after fog*	*Excess deaths*	*Percentage of total excess deaths*
Bronchitis	75	704	629	39
Other lung diseases	98	366	268	17
Coronary artery disease, myocardial degeneration	206	525	319	20
Other diseases	508	889	381	24
TOTAL	887	2,484	1,597	100

SOURCE: Royal College of Physicians of London (1970).
[a] Statistics for the County of London (population 3.3 million).

32 In the case of chronic exposure at a moderate level to atmospheric pollutants, there may be harmful effects on the respiratory tract (bronchitis and emphysema, lung cancer, impairment of functions and sensory irritation of the eyes and nose). Such pollutants may also affect mental health For example, lead poisoning in children can produce irreparable brain damage with permanent mental retardation In the slum areas of industrialized cities, children often have symptoms of brain damage due to severe exposure to lead Lastly, from the point of view of well-being, living in a gloomy and smoky atmosphere probably has a physiological effect on man which, although less dramatic, may help to disturb his equilibrium and happiness Few studies have been made on this subject, which will undoubtedly become increasingly important in the future.

33. Among the many chemical substances capable of polluting the air, lead and other toxic metals are the subject of detailed research, as are various inorganic

and organic compounds. However, in general, epidemiological studies are available only in respect of small populations living near the sources of pollution. An expert committee of the World Health Organization (WHO) has defined the criteria for air quality standards in respect of the following pollutants: (*a*) sulphur oxides and particulate matter; (*b*) carbon monoxide; (*c*) photochemical oxidants; (*d*) nitrogen dioxide.

34. Industrial development has been accompanied by a level of water pollution which makes it increasingly difficult to satisfy growing needs. Water is considered polluted when its chemical, physical and biological properties, or discharges into it of solid, liquid or gaseous substances, are likely to create nuisances or to render the water harmful to public health, welfare and safety, or to domestic, commercial, industrial, agricultural and recreational activities, or to livestock, wild animals, fish and other aquatic life. Water pollution also includes the rise in temperature due to the discharge of hot water (thermal pollution). Health may be affected by the direct ingestion of water (by drinking) or by its indirect ingestion (through food products), by the use of water for personal hygiene, agricultural and industrial purposes, recreational activities or simply by a person's living close to polluted water. Although, in the most highly industrialized developed countries, the risk of accidental biological contamination of water cannot be discounted, attention is devoted in particular to the risks resulting from chemical and radio-active pollution, especially as a result of outbreaks of mercury or cadmium poisoning.

35. In *International Standards for Drinking-Water*, minimum standards currently attainable in all countries of the world are proposed, with reference to five classes of quality parameters: biological, radio-active, toxic and chemical, and characteristics of acceptability. (See table 2.)

36. Food may also be biologically, chemically or radio-actively contaminated, a further risk thus being added to the other health hazards. This also applies in the case of soil pollution, which, in industrialized countries, is due mainly to:

(*a*) the use in agriculture of a very wide variety of chemicals;

(*b*) the dumping of large masses of waste materials from the mining of minerals and the smelting of metals;

(*c*) the dumping of domestic refuse and solids resulting from the treatment of domestic refuse and industrial wastes.

37. One of the most widespread annoyances of industrial civilization is that caused by noise. Whether in connexion with the work environment, with highway, urban or air traffic or in the home, the sources of noise are numerous, the noise level is high and the effects on health and well-being are manifold.

38. Repeated exposure in the course of employment to high noise levels may lead to deafness. To a lesser degree, the impairment of hearing acuity with age may be accelerated by exposure to noise. In addition, noise has a number of non-specific physiological effects which are not constant and whose impact on health is not clear, such as changes in the cardio-vascular and respiratory systems, in the eyes, in galvanic skin responses and in the blood and other body fluids.

TABLE 2. TENTATIVE LIMITS FOR TOXIC CHEMICAL SUBSTANCES AND CERTAIN OTHER SUBSTANCES HAZARDOUS TO HEALTH

Substances	*Maximum concentration (milligrammes per litre)*
Toxic substances [a]	
Arsenic (as As)	0.05
Cadmium (as Cd)	0.01
Cyanide (as CN)	0.05
Lead (as Pb)	0.1
Mercury (total) (as Hg)	0.001
Selenium (as Se)	0.01
Chemical substances hazardous to health	
Nitrates (as NO_3)	45
Polynuclear aromatic hydrocarbons [b]	0.0002
Pesticides	
Insecticides	No indication of upper limit
Herbicides	The toxological evaluation is based on
Fungicides	the concept of acceptable daily intake (ADI)

SOURCE: Data extracted from World Health Organization, *International Standards for Drinking-Water* (Geneva, 1971), pp. 31-37.

[a] On the basis of a daily intake of 2.5 litres by a man weighing 70 kg.

[b] The figure here refers to six representative compounds: benzo (a) pyrene; benzo (g,h,i) perylene; fluoranthene; benzo (c) acephenanthrylene; benzo (k) fluoranthene; and indeno (1,2,3-cd) pyrene.

39. The psychophysiological effects are felt mainly in connexion with sleep, the disturbance of which may, in the long run, adversely affect health, but, in this regard, epidemiological proof is lacking. The annoyance caused by noise, and the ensuing discomfort, also have an increasing psychosocial effect, both individually and collectively, on work performance.

The consequences of industrialization

40. Although working conditions have progressed considerably since the industrial revolution of the nineteenth century, industrial development, productivity, changes in technologies and in production methods still give the work environment a special dimension which is important to physical and mental health, particularly since it is indissolubly linked to general living conditions and to the environment generally.

41. Occupational diseases and injuries result from specific exposure at work but, in addition, work exposure may aggravate certain cardio-vascular, respiratory, nervous or mental diseases, for example, or may

contribute to the outbreak of diseases of multiple aetiology.

42. All the environmental pollutants, whether physical, chemical or biological, may be present in the work environment and generally in much higher concentrations than in the environment as a whole Furthermore, the work environment has hazards of its own For a large number of substances, an exposure level has been defined below which the worker's health is unlikely to be endangered (in terms of the threshold limit value, the maximum allowable concentration or the permissible dose).

43. The advances in work hygiene and safety have had the effect of reducing the risk of occupational exposure in large-scale modern industries As a result, attention has been turned to health and welfare problems connected with psychosocial factors, with working and living conditions and with urban, transport and leisure problems—all of which interact in a complex manner

44 A high degree of job mechanization may increase psychosomatic disorders, reduce job satisfaction and contribute to a higher rate of absenteeism Factors such as interpersonal relations at work, work stability, shift work, speed and safety are important Workers engaged in repetitive tasks, controlled by machines, derive less satisfaction from their work

45. Shift work creates a psychosocial working environment that may adversely influence the health of the worker. Night work, and the change of working hours from one shift to another, may subject the workers to certain stresses Such stresses affect the nervous system, increasing the frequency of peptic ulcer and of nervous symptoms, such as fatigue, nervousness, irritation and insomnia These nervous symptoms are usually related to lack of sleep, which in turn may be related to housing conditions and especially to disturbance of sleep by noise during the day if the worker is on night shift

46 Gastro-intestinal diseases are of multiple aetiology and the work environment may be a contributing factor, especially where there is emotional or psychological stress at work Shift workers, for instance, may have a higher incidence of peptic ulcer than day workers

47. It has often been said that the ever-increasing pace and stress of life, together with industrialization, brought about an increase in the incidence of mental disorders. That is probably true for psychosomatic and psychoneurotic illnesses, but there is no conclusive evidence on this subject.

48 On the other hand, epidemiological studies have shown that the incidence of functional psychoses, such as schizophrenia, was not affected by the level or speed of social and economic development. The constant increase in the number of people needing medical, psychiatric or social care is due to: (1) changes in social structures, the increase in the number of specialized jobs making it difficult to integrate the handicapped and the mentally retarded; (2) change in the structure of the family, nuclear families being generally less capable than extended families of solving the problems of the handicapped, and (3) increase in mental health services, enabling a more accurate assessment to be made of the incidence of mental illness.

49. In order to meet the demand for unskilled labour, many countries use migrant workers In Europe, there are 11 million migrant workers, coming from the economically less developed countries of Europe and Africa These uprooted, transplanted, poorly integrated workers live in conditions which represent in most cases a potential danger to their health and welfare Health services for migrants are often inadequate and do not make it possible for health problems to be identified and treated rapidly The migrant rarely finds in a foreign country the social structures to which he was accustomed in his own country, so that even trivial problems can have disastrous consequences for mental health

50 There are three typical case histories for migrant workers

(*a*) they may bring a disease with them when they come from a region in which communicable diseases are endemic,

(*b*) they may acquire a disease in the host country, the most prevalent being tuberculosis, the incidence of which is estimated to be from four to five times greater among migrant than among native workers,

(*c*) they may have adaptation difficulties arising essentially from problems of language and culture, "culture shock", the displacement syndrome and "foreigners' fever" being excellent examples of this kind of illness which are especially likely to occur when the migration was involuntary

Importance of mental, chronic and geriatric diseases

51. Despite the risks, it must be admitted that if the life expectancy of a population is taken as an indicator of health, industrial development and urbanization have been accompanied by a spectacular increase in life expectancy and that the general state of health is better in urban than in rural areas However, in the most highly industrialized countries, the increased life-span and the drastic changes in way of life and in the environment are associated with a greater incidence of non-communicable chronic and geriatric diseases The variety of mental and psychosomatic illnesses is more obvious and calls for closer study and increased action

52 It is to be hoped that scientific progress will help to reduce morbidity and prolong life. However, efforts to improve health should in future take the following direction. on the one hand, greater care will have to be taken to protect the essential biological ecosystems and prevent any further deterioration in the environment; on the other, closer attention will be given to psychosocial factors, not only to prolong human life and combat disease, but also to make life happier and more harmonious

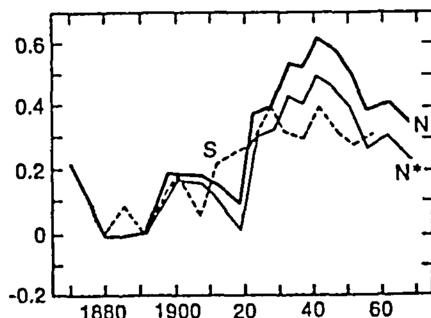
POPULATION GROWTH AND CLIMATE MODIFICATION

United Nations Environment Programme

Climatic fluctuations and their causes

1. In recent years, the problem of climatic fluctuations and of their physical causes has increasingly attracted the attention of scientists. Meteorological observations have revealed the occurrence of regional fluctuations. Distinct increases of temperature and/or rainfall do exist in some areas in marked contrast to similarly distinct decreases in other areas. Hemispheric or global averages are little affected. Only small temperature changes are observed (fig. I), while the figures of the global water balance between precipitation and evaporation are hardly sufficiently precise—due to the lack of data above vast ocean areas—to allow an evaluation of small deviations.

Figure I. Temperature fluctuations since 1880, averaged for the northern (N) and southern (S) hemispheres



Note: N* = corrected by omitting urban stations.

2. Climate can only be understood as a common property of the geophysical system: atmosphere, ocean and ice as a complex of fields which encompass many built-in feedbacks and instabilities. The fields of temperature, density, pressure and wind, of water-vapour with its essential phase changes, vary with time. The system is driven by energy exchange processes at the earth's surface and within the atmosphere at different scales, all with a quite diffuse pattern of sources and sinks. The most powerful energy conversions are connected with the hydrological cycle of evaporation, precipitation and run-off. To understand the mechanism of climatic change and of climate modification, one must simulate the atmospheric-ocean-ice system in a physico-mathematical model. If designed as the real earth with its land-sea distribution, its mountains and its continental and marine ice-cover, such models are of the highest complexity. From the scientific point of view, climatic models are of the utmost importance, even if they have reached only an early stage of development. However, for the purpose of the decision-makers, they do not currently permit more than some general conclusions.

3. Climatic fluctuations were observed long before meteorological instruments were developed: even during the past 1,000 years the extension of the Arctic sea ice has greatly changed, with a rather dramatic effect on human settlements and economic conditions in Iceland and Greenland. Similarly, the vegetation cover in marginal parts of the Sahara and in the arid areas of the Near and Middle East has been drastically reduced since the beginning of historic times. Only after many careful investigations has it become obvious that this disastrous change is not primarily caused by climatic variation, but by the increasing human impact on the fragile ecosystem—the hunting and extinction of predators and the destruction of vegetation by a growing number of domestic animals. After the rapid development of industries, man's inadvertent impact on climate has now become a matter of great concern among scientists.

4. Climate is controlled by the solar radiation, on the one hand, and by the properties of the geophysical system (atmosphere + ocean + ice (including the surface of the continents)), on the other. Table 1 gives a review on the most important factors controlling the very nearly balanced state of the system. The energy input by the sun's radiation has been considered by the majority of astronomers to be constant with time, at least in the "human" time-scale in the order of 100 years. There is, however, some evidence of small

Table 1. Causes of large-scale climatic fluctuations

Natural causes	*Man-made causes*
Astrophysical:	
Changes of the solar energy flux ("solar constant")	CO_2 increase
	Particulate air pollution
	Surface albedo changes
	Energy production and consumption
Geophysical:	
Stratospheric dust after volcanic eruptions	*Internal parameters* (feedback):
Antarctic ice surges	Changes of hydrological cycle (reservoirs, irrigation, deforestation)
Internal parameters (feedback):	Cloudiness changes
Changes of sea ice cover	

fluctuations of the so-called "solar constant", but as these observations have been taken within the stratosphere, they can also be interpreted as results of stratospheric turbidity due to volcanic eruptions. Such eruptions inject large amounts of small particles and particle-producing gases into the stratosphere (above 16 km in the tropics, above 8-11 km in middle and high latitudes). Due to the lack of clouds and precipitation processes in this layer, these particles remain, on average, a few years in the stratosphere (fig II), in contrast to a residence time of a few days or weeks in the troposphere. Stratospheric particles spread in a few months above the whole globe and concentrate later in the polar regions. They absorb and scatter a small part of sun's radiation and therefore reduce slightly (up to 1-2°C) the temperature near the earth's surface in the first years after a large volcanic eruption (as in 1963 at Agung in Bali, Indonesia).

Figure II. Residence time of aerosol particles in the atmosphere

5 Recent studies have indicated the probability that the large variations in the amount of subantarctic icebergs are due to surges of the 2000-m thick Antarctic ice-cap, which is partly based on a melting layer. Since these surges are quite rare events, very little is known about their geophysical conditions Their climatic effect consists of an immediate cooling of the subantarctic oceans (by melting) and in an increase of the albedo (reflectivity) of the surface, both effects probably lasting during several decades (or even centuries).

6 The above-mentioned fluctuations of the shallow Arctic sea-ice—with an average thickness of only 2-3 metres—are best documented in the time during which the coasts of Iceland were blocked by ice (fig. III). There exists a marked correlation between these fluctuations and the temperatures of the surface of the sea and air. It is very difficult to distinguish here between cause and effect, because of the (non-linear) interaction and

Figure III. Duration of blocking of the coasts of Iceland by Arctic sea-ice

(Weeks per annum)

the feedback mechanism involved (see also paras. 30-35) At any rate, the area covered by ice has varied by at least 2 million km² (about 20 per cent) during the past 1,000 years, and the thickness has also most probably varied by about 20 per cent

7 A numerical comparison between natural and man-made climatogenetic factors can currently be based only on reasonable estimates of their energetics (table 2) From one-dimensional radiation models it can be demonstrated that the most prominent natural geophysical factors generally lead to a cooling—of from one to three years duration in the case of large volcanic eruptions, and of 20-100 years in the case of medium-scale Antarctic ice-surges (as in the nineteenth century) Small variations of the solar constant are still controversial; however, variations of more than 1.0 or 1.5 per cent can be safely excluded

8 Since the greatest part (about 82 per cent) of the radiation budget of the earth's surface is used to evaporate water, only the latitudinal and regional differences of the heat budget are responsible for the atmospheric circulation which controls climate. These climatogenetic processes need, primarily, not more than a few thousand terawatts (TW). They are intensified by the redistribution of energy, especially of latent heat of condensation Comparatively small changes of cloudiness—*which are, at present, undetectable*—or evaporation contribute a few hundred terawatts. Changes of polar ice-cover (as observed during the past two centuries) subtract or add an energy amount in the order of 100-200 TW. This is the order of magnitude of recent climatic fluctuations as caused by natural effects.

INSTABILITY OF CLIMATE

9. Within the atmosphere, several instabilities are well known which are responsible for the vagaries of weather, such as heavy showers and thunderstorms, as well as the formation and decay of cyclones and anticyclones. [illegible]

TABLE 2. ENERGY ESTIMATES OF LARGE-SCALE CLIMATIC FLUCTUATIONS

(Unit: 10^{12} watts = 1 terawatt (TW))

Parameter	1970	
(a) *External parameters*		
Solar constant (extraterrestrial)		173,000 TW
Radiation budget (earth + atmosphere system)		123,000 TW
Radiation budget, earth's surface		48,700 TW
Geothermal heat flux		32 TW
Depletion of radiation due to stratospheric dust		−2000 TW (maximum)
Antarctic ice-surges		−50 to 100 TW per 10^6 km^2
(b) *Internal parameters* (with feedback)		
Change of cloudiness (± 1 per cent)		±350 TW
Change of evaporation: equatorial oceans		±300 TW
Area change of Arctic sea-ice		± 50 TW per 10^6 km^2
Energy budget of photosynthetic processes		± 92 TW
(c) *Man-made parameters*	*1970*	*2000 (projected)*
Increase of CO_2 content	+ 1.5 TW	+ 2.4 TW
Energy production	+ 8 TW	+ 40 TW
Tropospheric turbidity N. Hemisphere	+ 40 TW (total)	
Tropospheric turbidity: industry and cities	+ 2 TW	
Tropospheric turbidity: bush-fires, vegetation destruction	+ 5 TW	
Heat of savannah bush-fires	+ 3 TW	
Water consumption of irrigation to air	+140 TW	+390 TW
Conversion of tropical rain-forest	− 17 TW per 10^6 km^2	

irregular time-scale of 1-7 years with very short transition periods. Another example is the sudden drop of the Nile floods (as caused by the summer rainfall in the Ethiopian highlands) by 20 per cent in 1898; similar changes have been found in all African lakes between latitudes 15°N and 15°S. Recent investigations appear to indicate that many regional anomalies—e.g., droughts in central India, in the Sahel belt of Africa and north-eastern Brazil; the disappearance of cold nutrient-rich upwelling water along the coasts of Peru and Ecuador, known as El Niño, together with the above-mentioned equatorial upwelling in the Pacific—occur more or less simultaneously and affect increasingly the fragile economic balance of many less developed tropical countries.

10. The most recent example of a coincidence of these anomalies was 1972, partially extended to 1973. The coincidence of these anomalies—which have been observed, with irregular intervals, during the past 80 years—leads to a nearly simultaneous occurrence of severe food shortages (here including the protein production of the world's largest fishery industry in Peru). With increasing population, the sensitivity of national economics to such anomalies rises sharply; this is especially true when similar droughts and drops of the food production occur in higher latitudes, e.g., in Canada, the Union of Soviet Socialist Republics and the United States of America. The geophysical conditions of such coincidences—which are certainly not random—are not yet completely understood.

11. Even more interesting from the point of view of the climatologist, but much less frequent, are global-scale instabilities at both polar regions, the shallov Arctic sea-ice and the immense continental ice-cap o the Antarctic. It is impossible to review here in detai the possible occurrence of large-scale Antarctic ice surges, which could have produced, in a few decades, global cooling of the same magnitude as the last glacia tion as well as a sharp eustatic rise of the world's sea level by 15-20 m.

12. Such events are certainly rare, occurring only i a time distance of about 10,000 years. Investigations o the geophysical conditions of these surges will now b begun. However, there is sufficient evidence of a mino event of this kind around the middle of the nineteentl century, probably correlated with a cool (and probably rainy) period in tropical and northern latitudes.

13. Another instability of this kind—apparently somewhat slower and less acute—can be observed in the Arctic, in correlation with the varying extension and thickness of the sea-ice (see paras. 30-35).

14. The physical causes of these global instabilities are found in an equilibrium between the surface albedo (which depends very strongly upon the area extension of snow and ice) and the temperatures near the surface. The available evidence shows that this relation controls largely the time variations of hemispheric (or global) temperature averages, and furthermore (at least partially) the average position of the large-scale climatic belts. This equilibrium is quite sensitive against man-made modifications of one or another climate-producing effect (see paras. 15-22).

15. The impact of man's activity upon climate began in quite early times and under quite primitive conditions. It was his ability both to light a fire and to destroy the natural vegetation. From the physical point of view, several impacts have to be distinguished

16 First is the increase of carbon dioxide According to a number of measurements at the beginning of industrialization in the developed countries (between 1870 and 1900), the CO_2 content of the air was about 290 parts per million (part per million = 10^{-6} of volume) Owing to the burning of fossile fuels—coal, lignite, oil, natural gas—the CO_2 content of the air has increased to about 324 ppm now The rate of increase varies around 0 7 ppm per year Since only half of the CO_2 production is stored in the air, the other half in the ocean or in the biosphere (vegetation), it will further increase. Extrapolation for the year 2000 leads to a CO_2 content of 370-380 ppm, and to a value of more than 400 ppm in the first decades of the next century Absorption of infra-red radiation by carbon dioxide leads to rising temperatures, especially in the stratosphere. Near the surface, the warming effect is relatively small—about 0 4°C for an increase of 50 ppm—but not negligible compared with the observed changes

17. The air pollution, consisting of small dust particles (with a diameter between about 0 1 and 10 microns 1 micron is 0 0001 mm) has a natural background, caused by volcanic gases, ocean spray and forest-produced hydrocarbons Man-made particles are partially produced by such local sources as cities and industries More essential (and frequently underrated) are the non-industrial air-pollution sources: the dust-raising role of the destruction of the sparse vegetation in the marginal parts of arid areas, e g , by over-grazing ("man-made desert"), and the man-ignited bush-fires in the semi-humid tropics, both occur over areas of 10 million km² each, in contrast to the extension of industrial pollution over an area of only 500,000 km² altogether. Measurements of the atmospheric turbidity during the dry season in this area reveal values higher than those over the centres of industrialized cities, e g , Tokyo The effect on climate is twofold. a reduction of the sun's radiation in the visible part of spectrum as well as absorption and emission of infra-red radiation The latter effect causes warming (especially in night-time) and is usually stronger than the first one. In areas of strong pollution—marked by a drastic reduction of visibility and by a whitish colour of the cloudless sky—it may reach 1-2°C or even more (To avoid misinterpretation, it should be mentioned here that stratospheric dust also absorbs and emits radiation—but at very high altitudes and thus it is ineffective near the surface.) Under humid conditions, the average residence time of particles in the troposphere is only a few days (fig II), under arid conditions or in the dry season, it can rise to several decades Air pollution has increased not only in industrial areas, but—by a factor of 2-3—above the some industrial areas is only local, in many relatively "clean" rural areas it still increases steadily

18 Small changes of the surface albedo are frequently connected with agricultural operation and land-use practices Here it is very difficult to give representative figures It can be stated that with brighter colour of the vegetation and/or the soil (as seen from the air) the albedo increases and the net radiation available at the surface decreases, which would also reduce the evaporation

19. In the long run, the effect of energy consumption will become the greatest possible risk to climate According to the basic laws of physics, all energy is finally converted into heat and adds therefore to the natural energy budget of the atmosphere-ocean system This is mainly so for energy from fossil and nuclear sources—in the case of solar, hydroelectric and geothermal heat only a redistribution of energy takes place Currently, the total energy consumption by man has surpassed 8 terawatts (10^{12} watts, see table 2) This is only a minute contribution to the total heat budget of the earth's surface, but—considered above the continents alone—about the same as the geothermal heat flux from the earth's interior (9 TW) and somewhat smaller than the sum of the photosynthetic life processes in the whole biosphere If the storage of fossile energy in the form of coal, oil etc has remained constant during the past 500 million years, the reserves stored during about 500,000 years or more are now burned every year. It is therefore vital to look for other energy sources to be used in the future

20. The small contribution of man's activity to the atmospheric energy budget is misleading since it does not take into account the local energy distribution and its foreseeable development. Man's energy consumption increases exponentially by 5-6 per cent per annum and in some countries (e g , Japan) by more than 10 per cent An annual growth rate of 5 5 per cent is equivalent to a rise by a factor of 5 every 30 years, i e , within one generation Assuming the economic growth rate to be constant, the current contribution of 8 TW is expected to increase, after about 60 years, to 200 TW, as a permanent addition of energy to the geophysical system Today it is mostly concentrated in temperate latitudes of the northern hemisphere, to about two thirds on either side of the Atlantic This may change in the near future, when more and more developing countries enter into the industrial era. On this assumption, man's energy consumption will reach, a few decades after the beginning of the next century, the level of the observed natural climatic fluctuations—but then with a persisting one-directional effect: of warming This could have a dramatic effect in one of the most sensitive areas of the geophysical system—in the Arctic (see [illegible] 35)

21. On a local scale, this
pollution, CO_2 and addit

from urban climates. The "urban heat island" is always warmer than the surrounding area, mostly during the night and in the winter season. Local heating produces weak local wind systems converging at the heat centre. Under unstable weather conditions, this also causes an increased frequency of heavy showers and thunderstorms, displaced somewhat downwards with the prevailing wind direction. This local effect can be beneficial —earlier appearance of spring flowers, shorter duration of snow cover and other secondary effects are observed.

22. At a regional scale, the impact of man's energy contribution is beginning to be no longer negligible (table 3). If this energy is distributed evenly throughout an area, in a densely populated industrial area (e.g., the north-western part of the Federal Republic of Germany) a typical energy contribution of about 10 watts m^2 over an area of 10^4 km^2 is obtained as compared with a natural radiation budget of about 60 watts/m^2. Outside of industrial areas, such an even distribution is certainly unrealistic. The figures for several developed countries show that man's impact on the climate-producing energy budget now approaches about 1 per cent of the natural budget (which is, in the global average, nearly 100 watts/m^2). Since the energy consumption *per capita* is strongly correlated with the gross national product, one has to expect drastic future changes in this distribution.

TABLE 3. ENERGY CONSUMPTION, 1968
(Watts)

	Area (millions of square kilometres)	*Population (millions)*	*Energy consumption (thousand millions of watts)*	*Energy consumption per capita (thousands of watts)*	*Energy consumption per area (watts per square metre)*
Western and Central Europe	1.60	257	1,054	4.1	0.66
USSR, European part [a]	4.00	171	923	5.4	0.23
Eastern Europe	0.99	102	433	4.2	0.44
United States of America [b] and Canada [c]	2.49	144	1,990	13.8	0.80
Total	9.08	674	4,400	6.6	0.49
Japan	0.37	99	263	2.7	0.71
Africa, South America	48.1	516	212	0.41	0.004
All continents, except Antarctic	135.8	3,483	6,460	1.86	0.048
Industrial zone in the north-western part of the Federal Republic of Germany	*0.011*	*11.8*	*110*	*9.4*	*10.3*

[a] Excluding the north.
[b] North-eastern part only.
[c] South-eastern part.

MAN'S IMPACT ON THE WATER BUDGET; THE ROLE OF VEGETATION AND LAND-USE

23. More urgent than the man-made input of energy into the geophysical system is the increase in the consumption of fresh water. From the standpoint of climate, one has only to consider that part which is evaporated and does not return to the rivers (table 4), which currently contributes about 3 per cent of the annual evaporation of the continents and consumes more than 5 per cent of run-off. The average fresh-water consumption increases by 3-4 per cent per annum. This growth rate is certainly greater than the growth rate of the population. It must be at least maintained, because of the increasing need of the new "miracle" crops and the urgency to nourish a rapidly growing population.

TABLE 4. WATER CONSUMPTION
(Cubic kilometres per annum)

	1965			*2000 (projected)*		
	Usage	*Run-off*	*Air*	*Usage*	*Run-off*	*Air*
Municipal use	98	56	42	950	760	190
Irrigation	2,300	600	1,700	4,250	400	3,850
Industry	200	160	40	3,000	2,400	600
Power Stations	250	235	15	4,500	4,230	230
TOTAL	2,848	1,051	1,797	12,700	7,790	4,910

SOURCE: M. J. Lvovich, *Vodnie ressuissi budushevo* (Water Resources for the Future) (Moscow, 1960).
Note: For comparison: natural run-off (continents) 35,000 km^3/a;
natural evaporation (continents) 65,000 km^3/a.

24 Assuming the area of potentially arable soils in semi-arid and arid countries to be 7 million km² (including 2 4 million km² in extratropical latitudes), effective irrigation (with 2 m per annum in tropical and subtropical areas, but only 1 m per annum outside the tropics) needs a total of 11,600 km³, i e, about one third of the total continental run-off, and nearly three times the estimate given by Lvovich for the year 2000 Since the rivers feeding the arid belt yield only a small fraction (about 800 km³/a), desalination of ocean water will be necessary, a process which demands much energy. While desalination of ocean water by distillation needs 47-60 kWh/m³ (as in the area of Hong Kong or in Kuwait), the process of reverted osmosis needs only 3 kWh/m³, but has not yet been developed to technological maturity Even if this technique can be used in the foreseeable future in large plants, desalination of 6000 km³/a (or one half of the above-mentioned total) would need about 2 terawatts, i e one fourth of the current world energy consumption. Higher estimates of the potentially arable area would even more aggravate the situation.

25 The conversion of the natural vegetation by man has, to a varying degree, changed the climate-producing factors of the surface over at least half of the continental area, i e, over about 15 per cent of the total surface of the earth Without going into the details of a physical theory of climate, only the following factors are mentioned here: (*a*) surface albedo (see paras 15-22), (*b*) evaporation (of soils) and transpiration (of plants), humidity of air; (*c*) soil moisture and heat conductivity, (*d*) surface roughness and wind speed

26 Among the most efficient conversions of natural vegetation are the irrigation of arid areas—the total irrigated area is now about 2 million km²—and the clearing of forests and their use as grasslands While in the first case the evapo-transpiration increases sharply from zero to values near 2 m per annum, deforestation—which was begun by early man several thousand years ago—tends to decrease the original evapo-transpiration by values up to 20 per cent and more Both types of conversions have very little effect on rainfall: 87 per cent of the water vapour in the atmosphere comes from the ocean An evaporating water droplet remains, on average, 9 days in the atmosphere before it rains out once more During this time it usually travels several thousand kilometres from its origin. But these conversions have a marked effect on local (and regional) evaporation and on run-off, as well as on the ground-water reserves In several arid countries (for example, at the northern margins of the Sahara), the deep ground-water reserves are fossil They were formed under the climatic conditions of the last ice-age 20,000 years ago and are not renewable when over-exploited In arid areas also, no relief is to be expected from artificial rainfall techniques These are only effective under very special climatic conditions with high humidity and a great amount of low clouds

27 Of great importance is the more or less complete degradation of the natural vegetation, caused by increasing population and their immediate needs for food, milk and firewood The limits of the Sahara desert are said to expand annually by about 1 km on both sides This statistical average means an area increase of 10⁴ km² per annum This man-made (or goat-made) effect is in fact terrifying It has certainly contributed to the current situation (1972-1973) in the West African Sahel belt, which is worse than during a similar drought lasting seven years between 1907 and 1914. In many other areas, the search for firewood has destroyed even large fiull-grown forests, for example, in the Mediterranean and in many mountains of the Near and Middle East as far east as Afghanistan and Kashmir In tropical rain-forests, the soil is so leached that after its clearing the vegetation degrades mostly to useless grasslands (e g, in the central hills of Fiji)

28 In most of these cases, the climate itself is but little modified; but the degradation of soils and vegetation, the lowering of the ground water and the tendency to soil erosion and disastrous floods interrupted by long dry periods lead to a serious deterioration of the physical and biological environment This damage is in some cases reversible before the soil is destroyed—but only when protecting the area completely against any kind of use In the remaining parts of the equatorial rain-forest, e g, in the Amazon and Congo basins, even a reduction of rainfall after large-scale deforestation (as a consequence of a reduction of area-averaged evaporation) is possible.

29 In already over-populated areas of the tropical and subtropical belts these modifications have already reached a dangerous limit They affect certainly not less than 20-30 million km² and spread rapidly with the increase of population, of food production and of overgrazing Their effect on the local and regional water budget is difficult to assess numerically, due to the lack of data from an intact natural state

The problem of the arctic sea-ice

30 Here one is confronted with a serious question the extent to which the exponentially increasing consumption of fresh water and energy can modify the world's climate—especially when taking into account its potential instability. An increasing number of far-sighted scientists—looking beyond the relatively stable period of the past 200 (or even 1,000) years—envisages the potential risk of large-scale climatic modifications Due to the quite different regional situation and to other restrictions, it is hardly possible to set a limit with a marker, "Trespassing Prohibited" Assuming 200-300 TW as the best available estimate of natural climatic fluctuations, one can try to extrapolate the current trend of man-made effects Raising the consumption of (fossil and nuclear) energy by a factor of 20- reach this critical level. Raising the ion by a factor of 4-6 will

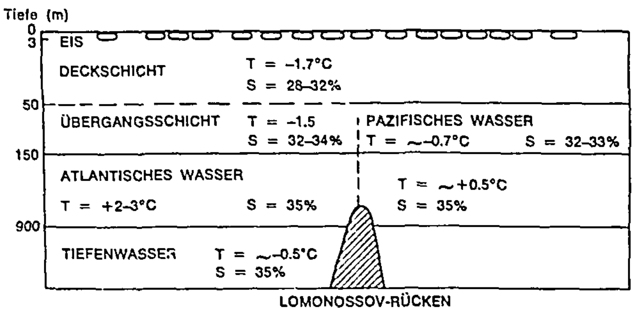
reserves. Desalination of the oceans in a large manner will certainly aggravate the energy situation. If an extrapolation of the current exponential growth rates is allowed—this is well beyond the limitations of this report—one must conclude that a critical threshold can be reached within 50-60 years. Taking into account the potential instability of the climate and the different intensity of man's impact, the threshold could be reached even earlier. Several recent experiments to simulate climate with physico-mathematical computer models have revealed an astonishingly high degree of sensitivity of the geophysical system. These results—regardless of the inherent deficiencies of some models—should be taken with caution, but yet rather seriously.

31. The greatest risk of a large-scale climatic instability at this time is that of a drastic modification of the Arctic sea-ice, which is apparently in a delicate state of balance. This is especially true because of the general trend of warming by all essential man-made modifications, concentrated (at least now) in the Atlantic section of the mid-latitudes.

32. Historical and geological evidence shows that some marginal parts of the Arctic (around Greenland and the Canadian Archipelago, and along the Siberian coast) had been ice-free during the post-glacial optimum 5,000 years ago, but that the central part has remained unaltered for about 120,000 years. What are the inadvertent consequences of man-made environmental changes on this delicately balanced state? The problem has been carefully investigated and simulated in an one-dimensional model of the air-sea-ice system, showing that in each melting season (from mid-June to end of August) about 50 cm of surface ice is melted, while during the rest of the year the same amount freezes from below depending upon many oceanic and atmospheric quantities. Figure IV gives an idealized cross-section of the strafication of the Arctic Ocean. During the next few decades one has to expect three significant actions of man, unintentionally affecting this sensitive balance in the same direction:

(*a*) The need for additional fresh water in arid Central Asia (USSR) will be met by the diversion of the large Siberian rivers, Ob and Yenissei; a similar development can be expected in the Mackenzie catchment in Canada. With such a reduction of fresh-water inflow,

Figure IV. Vertical stratification of the Arctic Ocean



the salinity of the top layer of the Arctic Ocean will in crease and in turn ice growth will decrease. When th density—here depending mainly upon salinity—of th top layer reaches that of the underlying water, stron vertical mixing will prohibit ice production. With conservative estimate of the loss of fresh-water inflov (12 per cent) this event can be expected after som 50-100 years, neglecting, as a first guess, positive o negative feedback effects involved;

(*b*) Even more essential is the man-made warmin of air and water, concentrated in the Atlantic section Assuming the actual flux of air across latitude 70°N tc remain constant, but with a warming of 1 °C, this woulc be sufficient to reduce the mass-budget of the sea-ic by 4 cm per annum. This effect alone may also cause disappearance of the ice in less than a century. Man-made warming of the ocean should be smaller, but no negligible, and adds to this result;

(*c*) As a consequence of the current energy crisis, the oil reserves of the Alaskan Shelf will be exploited in the coming decades. In this case, leaking oil can hardly be prevented from spoiling the snow surface of the ice floes—where the bacteriological processes act extremely slowly, due to the low temperatures—and lower their albedo, which in turn leads to a significant lengthening of the summer melting period.

33. All these effects are working together. Their combination can be expected to lead to a total destruction of the ice-cover in a period of a few decades. Once completely destroyed, the sea-ice cannot be rebuilt under current climatic conditions, except during winter in the coastal belt. This process is almost certainly irreversible. In this case the change of the heat budget will be quite dramatic. Instead of 35 per cent storage of the incoming radiation during the 24-hour polar summer, about 90 per cent would be absorbed and stored in the ocean. While the winter temperatures should increase from about —32°C to near 0°C, the summer temperatures rise only from about 0° to 3-5°C.

34. Such a change must be accompanied by marked changes of the global climatic pattern. It is impossible to discuss here the results of the investigations of this situation, as undertaken from several groups in the USSR, in the United States of America, in the United Kingdom of Great Britain and Northern Ireland and in the Federal Republic of Germany, based on different models. While the summer conditions are only little affected, the modification in winter should be quite dramatic. In contrast to general belief, it could lead to marked cooling above mid-latitude continents and to a northward displacement of the subtropical anticyclonic centres with a marked change in the path of cyclones. This displacement of the subtropical high-pressure belt must strongly reduce rainfall in such sensitive areas as the Mediterranean, the Near and Middle East and California (United States of America). One should also expect significant changes in the tropical rainfall distribution, even beyond the equator. Certainly many further investigations with more realistic mathe-

matical models are necessary, before the climatic consequences of an ice-free Arctic Ocean can be outlined with sufficient accuracy.

35 If unlimited growth of population must be correlated with unlimited economic growth, including energy consumption, very serious risks of irreversible global-scale climatic modifications must be envisaged. This is especially true for the fresh-water budget (and thus for food production), here an exhaustion of available reserves is to be expected in several areas. Desalination of sea water is possible at high costs, but will aggravate the energy situation Such climatic changes may perhaps be beneficial in some regions However, their effect—especially in respect to the fresh-water balance—certainly will be disastrous to many other densely populated areas. Obviously, this risk will provide one of the earliest absolute limitations to population growth.

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ANNEX

Glossary of terms

Albedo reflectivity of the surface (reflected radiation as a percentage of the incoming radiation)

Anticyclonic centre centre of high air pressure

Eustacy world-wide change of sea level as contrasted with local diastrophic uplift or subsidence of land

Evaporation loss of water vapour from soil or from water surfaces

Evapo-transpiration loss of water vapour from soil and plant cover

Irreversible never to be reverted

Precipitation sum of rainfall, snow and hail.

Solar constant radiation of the sun at the upper limit of the earth's atmosphere on a surface perpendicular to the rays

Stratosphere atmosphere between 16 km (in the tropics), 10-12 km (in higher latitudes) and 50-km altitude

Terawatt 10^{12} (or 1,000 000,000,000) watt — unit of energy

Biological terms

Ecosystem ecological system of plants and animals living together in a uniform environment

Osmosis penetration of a liquid through a membrane

Photosynthesis production of living matter by converting the sunlight

NATIONAL POLICIES AND EXPERIENCES RELEVANT TO URBAN DEVELOPMENT: AN EVALUATION *

Lloyd Rodwin **

1. This paper deals with the lessons that interested decision-makers—especially those serving developing countries—might draw from the experiences of those countries which have attempted to devise policies to guide urban development. The inferences are based on the programmes of many different countries in all the major regions of the world. However, particular emphasis is placed on the experiences of five countries: France, the United Kingdom of Great Britain and Northern Ireland, the United States of America, Turkey and Venezuela. [1] The first three are relatively advanced economically; the others are not. The evaluation considers the way in which such policies evolved in developed and developing countries, the goals sought, the methods employed, how and why programmes differed and resembled each other, how successful the efforts have been and some of the lessons which can be drawn from these experiences. It concludes with seven cautionary observations—inferred from an evaluation of these experiences.

GERMINATING CONDITIONS

2. Two conditions generate urban growth strategies: growth problems must be recognized as critical; they must also appear capable of solution. Otherwise, it would be difficult to persuade the central Government to redefine its aims and to reorganize its tools and organizations. Governments, like people, shy away from abstract issues and certainly do not bestir themselves very much unless an issue threatens to be persistent, prominent and likely to cause trouble if ignored. Once an issue acquires these characteristics, however, it becomes part of the agenda of government and takes the status of what Hirschman has called a "privileged" problem. [2] Efforts to formulate urban growth strategies are especially interesting at the current time becaus they are in a transitional state. Problems of urba growth and development are on the verge of becomin privileged problems.

3. None of the central Governments concerned wit these issues began to think in terms of such strategic until a wide range of specific and obdurate problems— of cities, within cities and between cities—had becom highly visible. At first, they dealt with components c the problems, such as housing, industrial location transportation, recreation and education. Only later di they grapple with the more basic problems of suburba growth and of the relationships between metropolita regions and central cities. At approximately the sam time, the problems of poverty and of lagging region came to be treated as specific components of the large more complex problem of managing the economy. Th efforts to limit the growth of cities and to promote th growth of lagging regions proceeded independently a first, by they eventually converged. This convergenc was accelerated once the essential interdependence o these programmes began to be more fully appreciated This, in turn, resulted in a quest for the elimination o inconsistencies, for more coherence and for mor effective means of execution.

4. Extreme phases of the economic cycle, in particular, prosperity, also reinforced efforts to help lagging regions. This had not been true in the past Until there was deep interest in the lagging regions, both prosperity and economic crises only diverted whatever attention was given to the problem. Once such interest emerged, however, prosperity and economic crises began to highlight regional discrepancies and problems of programming infrastructure investments equitably and efficiently. A modicum of political stability, a moderately effective civil service and some control or influence over capital allocations as well as tax policy sufficed to make the remedial efforts appear practicable. All that was necessary to spark action was the conviction of key decision-makers that they could do something to correct a serious imbalance and to produce more efficient or more socially desirable patterns of development. This sense of need and opportunity impelled the United Kingdom to ring London (and subsequently, other areas) with New Towns, spurred France to counter Paris with equilibrium metropolises, prompted the United States of America to confront the

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[1] This paper is based on (and borrows extensively from) the relevant sections of Lloyd Rodwin, *Nations and Cities* (Boston, Mass., Houghton Mifflin Co., 1970). There are, however, also substantial additions to these materials as well as revisions of them.

[2] A. O. Hirschman, *Journeys Toward Progress* (New York, The Twentieth Century Fund, 1963), second and third paragraphs.

suburbs with urban renewal, led Venezuela to exploit its oil economy to foster the regional development of Guayana, and induced Turkey to try to offset the growth of the Marmara by encouraging urban development in other regions

5. As this blend of circumstances is tantamount to a complex set of pre-conditions, the strategies evolved very gradually This was not true in other related cases, such as in the relocation of a capital or in the decision to make massive investments to exploit the resources of a particular region These were extraordinary responses to special opportunities or needs, some of these efforts, because they are massive, constitute national policies even if they are only implicit. But they do not necessarily lead to systematic, formal policies and programmes for the development of other cities and regions. In Turkey, under Mustafa Kemal and Inonu, they did not The establishment of the new capital and the stress on urban development were important experiences and served as a reminder that new growth centres could be established But the problem still had to be tackled afresh a generation later [3] On the other hand, in France, the United Kingdom, the United States and Venezuela (and in Turkey, after the revolution of 1959), the adoption of national policies led to the creation of intellectual beach-heads, of administrative mechanisms and staff which could spread the essential ideas to strategic points inside and outside the Government. Over time, the increasing awareness of the commitments, the greater visibility of the policies and programmes, and the egalitarian pressures on Governments led to the extension of these policies and programmes In all five countries, it took at least a generation before goals and policies were even roughly articulated, and it will take many years, perhaps another decade or a generation, before these ideas are translated into effective, systematic strategies.

6 None the less, one can expert a more rapid introduction of programmes to guide urban growth in the future, for most of the essential elements are now known. Whether one is concerned with policies, organizations or instruments, there are now a number of operating models They offer a starting-point for thinking about a wide range of urban growth problems and of ways of dealing with them the choice of goals and development alternatives, the administrative machinery; the incentive, control and review mechanisms; the inescapable constraints; and the appropriate relationships between development and planning agencies at different levels of Government The existence of such models accelerates similar efforts elsewhere. This is evident by the speed with which underlying ideas are spreading The notion of New Towns, basically British in origin, is now in vogue almost everywhere; and so are the ideas of urban renewal, an innovation of the United States, and of growth poles, a French doctrine, although none of these ideas were bruited about before the end of the Second World War.

[3] Cf L Rodwin, *op. cit*, chap 4

7. The popularity of these ideas, however, is not at all a measure of their success. Actually, the difficulties encountered suggest that the problems of managing growth are formidable and are likely to evade easy solution. The United Kingdom has wrestled with some of them for more than a generation, and is only now perhaps on the verge of achieving its objectives France began earlier, but it still has a long way to go—probably further than the United Kingdom—even though the formal administrative machinery in France appears more highly developed and the strategy of promoting equilibrium metropolises more explicit

8 One could roughly rate these and other countries on the relative sophistication of their efforts on a number of counts the adequacy of machinery to define development goals, not only aggregatively but by sectors and regions, the means that exist to co-ordinate development programmes by sectors and by regions, the explicitness of the basic urban and regional development strategies, the quality of staff and training programmes, the effectiveness of programmes enlisting contributions from the private sector, the linkages that exist among social, economic and physical elements, the capacity of local and regional organizations to handle their responsibilities, and the provisions for evaluation and improvement of performance as the programme continues What is especially noteworthy is that, although such an examination would point up serious short-comings in each of these countries, it would also disclose that the concern in each country was with how to refine policies and to improve mechanisms, not with how to get rid of them

9 In short, gaps in the understanding of theoretical and pragmatic relationships have not precluded the adoption of such strategies On the contrary, when the need to act was agreed upon, then the disposition was either to experiment and to learn or, as Hirschman suggests, to follow "The Principle of the Hiding Hand" [4]—that is, to underestimate the difficulties or to over-estimate the benefits. In all of the cases studied, recourse to action on a significant scale sooner or later began to spur the necessary theoretical and applied research to substain and extend these efforts Moreover, because of the rapid spread of knowledge and experience, future experiments with development policies and programmes will acquire more of an adaptive character than an innovative one This likelihood should further reduce the period between the initiation of such programmes and the development of more explicit, systematic policies and provisions for their implementation

THE ENVIRONMENT FOR URBAN GROWTH STRATEGIES

10 France, Turkey, the United Kingdom, the United States of America and Venezuela differ in size, climate, resources and location. They range from small to large,

[4] A O Hirschman, *Development Projects Observed* (Washington, D C, The Brooking Institution, 1967), chap 1

tropical to temperate, meagrely endowed to well endowed, and peripheral to central in their location. The five countries also differ in their institutions. Politically, they range from relatively centralized (France and Turkey) to relatively decentralized (United States). Socially, their cultures vary from relatively egalitarian (United States) to relatively hierarchical (United Kingdom). All have varying elements of homogeneity and heterogeneity, depending upon the criteria used for measurement. None of these differences have precluded the adoption of urban growth strategies, although they have influenced the effectiveness with which they were carried out.

11. The economies of these countries also differ widely. Some are poor, others rich; some are narrowly, and others widely, diversified. At the time they initiated their programmes, Turkey and Venezuela were in the take-off stages of industrialization; the others were highly industrialized and service-oriented. France, Turkey and the United Kingdom faced serious and immediate economic strains; the others did not. France had slow population and industrial development for more than a century; the others experienced the reverse. Both the more and the less economically developed countries are trying to spur national economic growth through the encouragement of growing regions. However, the economically advanced countries are also trying to arrest the decline of some regions, a decline stemming from changes in the location of industries, whereas the poorer countries are trying to induce development in primitive hinterlands. The lagging regions are prominent issues, particularly in the poorer countries, because of their magnitude and because a few of these regions may have very significant growth potentials.

12. These economic differences can affect urban and regional development strategies in fairly obvious ways. The most important involve the opportunities and constraints inherent in having relatively limited or relatively ample resources or in having a vigorous private sector and mature economic institutions [5] or the reverse. Another involves the differing psychological, as well as economic, significance of opening a *hinterland* rather than arresting its decline. What is intriguing, however, is that even though these differences have affected opportunities for development, they have not otherwise changed the main outlines of the urban and regional strategies adopted or the more general definitions of the problems on which they are based. Each of these countries believes it suffers from overconcentration in congested cities in some areas, underconcentration in others, and from undesirable and unnecessarily large regional differences in levels of social and economic development. All believe that they need to change the way the metropolis grows and to promote urban growth centers in the less prosperous regions.

[5] Examples are varied credit mechanisms and business and consumer services.

13. Institutional differences can be significant f tors also. An urban growth strategy involves contr incentives, and pressures to influence the scale and p tern of development of metropolitan regions. It requi priorities for regional development and measures implement them. It means favouring a West or a No against an East or a South. Even if the measures not go counter to dominant trends or powerful intere they presuppose choices among alternatives which v shift costs and benefits for cities and regions and aro stormy conflicts. Such policies ought to be easier work out in countries with centralized Governmen hierarchical social systems and homogeneous cultur In point of fact, they are—but subject to a numb of important reservations. In a country with a we local system of government, opposition to the cent Government policy is crippled; but it is also harder carry out the policy effectively in the field without ab local or regional organs of government. The urban a regional aspects of growth strategy in Turkey a Venezuela betrayed serious weaknesses because failings at this level. [6] On the other hand, a we national system of Government is unable to develop strong central policy for regional development, exce through powerful incentives; relatively effective loc state or provincial governments; or a vigorous syste of private enterprise. The existence of any or all these conditions is exceptional. But they did prevail the United States of America in the nineteenth centu and were responsible, in part, for its development.

14. A hierarchical social and political system- where the governing class is accustomed to gover where other classes are accustomed to acquiesce a where private interests have relatively less power—c more readily evolve urban and regional growth polici at the national level than systems under the sway the market, local political jurisdictions or egalitari political processes. This is one reason why urba growth policies burgeoned earlier in France and in th United Kingdom than in the United States. [7] But hierarchical system—whether social or administrativ or both—has serious weaknesses in execution. It ge erally suffers from "apoplexy at the center and anemi at the edges", problems that both France and th United Kingdom, as well as Turkey and Venezuela, a struggling to solve. On the other hand, if problem become serious enough (or simply appear to be seriou enough), national strategies will emerge even in marke oriented environments. For example, the current furo over the problems of the central city in the Unite States, and, to a lesser extent, over the problem o energizing less prosperous areas, is prompting th Government to follow roughly the same course taken i the more hierarchical and centralized environments—

[6] L. Rodwin and others, *Planning Urban Growth an Regional Development: the Experience of the Guayana Pro gram of Venezuela* (Cambridge, Mass., Massachusetts Institut of Technology Press, 1969); see also *idem, Nations and Citie* chaps. 3 and 4.

[7] L. Rodwin, *Nations and Cities*, chaps. 5 and 6.

albeit with significant adaptations to take account of racial issues and differences in planning institutions.

15 All told, the adoption of variants of the same strategies in a wide range of different environments underscores the common problems and trends and conventional ways of thinking about these matters Even more significant, perhaps, is the fact that in all of these countries, the common denominator is the conviction that the guidance of urban growth strategy cannot—or, rather, must not—remain only at the local level.

Concepts and goals

16 The urban growth strategies of countries are hardly mature, but one can already speak of a "traditional" approach to urban growth issues and of problems characteristic of this approach It has become increasingly customary for development specialists to consider the role different cities and regions might or ought to play in the development of a country, and hence in the programming of infrastructure and in the shaping of industrial and other development policies In France, the United Kingdom and Venezuela, this definition of roles has led to quite different decisions about development priorities, and such differing results comfort planners who want urban and regional considerations taken more explicity into account.

17. None the less, there are difficulties imbedded in these ideas which need to be faced. Most planners, for example, are disposed to believe that development efforts will eventually founder if basic concepts are hazy and if development aims are obscure. Based on these assumptions, the future prospects of urban growth strategies rest on two "fuzzy" assumptions—the disadvantages of big cities and the feasibility of promoting growth centres—which no one to date has been able to define operationally. One does not really know when a city is too big or too congested, rather than merely poorly organized, and man has as yet learnt little more than the rudiments of how to convert an urban centre into a growth centre and how to radiate the effects of such growth centres over surrounding *hinterlands* However, this is not the first time (and probably not the last) that decision-makers have to manipulate forces which they do not fully understand.

18. The situation may appear to be all the more discouraging because development aims are defined obscurely in most countries, and not just in the United States of America, whose aims have scarcely been formulated at all The British goals, for example, of encouraging growth centres and reducing unemployment in the lagging regions are still so vague that they hardly provide an adequate basis for evaluating progress, or even for gauging how much of the changes in the character of urban development can be attributed to the measures undertaken The French goals appear to be more explicit. The notion of equilibrium metropopolises identifies the metropolitan regions where growth is to be encouraged and defines the strategy to build up large cities to compete with Paris. [8] But conflicting national aims, not to mention *pressures from* other cities and regions, drain away much of the substance of this policy, so that in France, too, it is difficult to say what level of performance would represent satisfactory progress in carrying out its strategy within a reasonable period The objectives in Turkey are far vaguer still. There are no explicit commitments, only general intentions of encouraging growth centres and correcting imbalance between growing and lagging regions Plans are prepared which are supposed to be backed up by the Government of Turkey and by private investments in the designated regions; but, more often than not, this fails to occur.

19 The sole exception, perhaps, is the experience of Venezuela Plans for Guayana were incorporated into the national plan, and specific, staged targets for regional investment, production and exports were linked to plans for national development. But this was true only for the Guayana region [9] Indeed, the success of Venezuela's policy was possible only by focusing on one region whose development had national significance and by systematically exploiting the unique resource endowment of the region with relatively ample capital resources Even under these highly favorable circumstances, the projected targets aggregated many important elements and were meaningful and well-implemented only in comparison with the way regional plans were prepared elsewhere

20 The experiences of these nations indicate the ambiguity and the range of variation that might be expected in the definition of aims in the early years of such a planning venture, and perhaps for many years thereafter They suggest that it may be impossible—at least at the outset—for a government to formulate adequate or precise national goals for urban and regional development. What appears to be a far more feasible approach is the preparation of some general guidelines which can later be successively redefined It may also be possible to work out somewhat more adequate and more detailed development goals and programs in one or two regions These can then be tried and evaluated and serve as a training ground and as a guide for efforts elsewhere.

21 Of course, it is more customary, and attractive, to argue that clear goals should be set from the start But this does not appear to be an option. It is very hard in the early stages to devise solutions to complex problems or to obtain backing for new ways of dealing with them. However odd it may seem, it is easier and often more realistic to fix precise goals in the middle or towards the end of a programme. Effective goals

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[8] J Hautreux and M Rochefort, *La fonction régionale dans l'armature urbaine française*, Commission [illegible] de l'aménagement du territoire (Group V), Commissariat général [illegible] plan et direction de l'aménagement foncier et l'urbanisme (Paris, Ministère de la Construction, [illegible]); see also P [illegible]chet, 'La comptabilite economique [illegible] et son [illegible] *Economie appliquée*, vol 14 No 3 ([illegible]), pp 71-[illegible]

[9] J Friedmann, *Venezuela From Doctrine to* [illegible] (Syracuse, N Y, Syracuse University Press, 1965)

presuppose awareness of what is feasible and desirable. They are, in effect, the fruition of much thought and experience and substantial consensus. This implies a learning process, often stretching over a decade or two. During this period, however, vague formulations and limited efforts, for all of their inadequacies, serve a useful purpose. They indicate general directions and invite the necessary initial critiques and refinements of goals and methods. In the course of these efforts, the bureaucracy and the public are given time to familiarize themselves with the issues and time to devise ways and means of dealing with unsuspected difficulties, or of avoiding further entanglements.

22. Despite the relatively obscure objectives indicated in the cases mentioned above, the kinds of measures deployed in these different environments have been fairly limited. The principal ones involve changing the rate of growth of a major city and encouraging development in growth zones within metropolitan regions and in other areas. The traditional instruments for these purposes range from controls to a variety of development schemes and incentives for public and private investment programmes. [10] Of course, it makes a difference how these measures are applied: whether there are many loop-holes in the controls, whether the incentives are significant enough to induce the desired outcomes, whether all or only some of these instruments are deployed, whether the diverse efforts are made by one organization or by several, whether the policies are reinforced by other policies and programmes of the national Government. The pattern to date—in France, the United Kingdom and the United States of America, and, to a lesser extent, in Turkey and Venezuela—is for simple, limited measures to be initiated at the outset, out of prudence and ease of innovation and possibly also out of lack of conviction or clarity either about the goals or the efficacy of the means.

23. This prudence is understandable. With a relatively new policy where it is difficult to foretell the problems that may be encountered or the consequences of policy choices, the best the decision-maker can do in the beginning is to develop simple analytical and administrative machinery that may be made more efficient with time and to avoid major and relatively inflexible commitments until there is more of a consensus, or until the decision-maker is more certain about what is likely to happen. Later, as goals become clearer and if they still seem worth pursuing, he can either improve the tools (tighten or extend the controls, enlarge the premiums, change the definition of areas, perfect the co-ordinative mechanisms) or devise new tools to make the efforts more successful. He may also decide that the aims are wrong, or more probably, that they could be realized more efficiently by still other means; in that case, he might relax controls and place more reliance on other tools, such as the price system.

24. This orientation today towards more controls and larger subsidies is all the more striking since, as have been observed, the experience with controls and incentives has been until recently somewhat disappointing. They have generally proved to be inadequate as a means of reversing a powerful force such as the expansion of a capital or a dominant metropolis. The opportunities for evasion are legion and the strain of enforcement on the administrative apparatus is severe. In France and the United Kingdom, after a generation of effort, the controls and incentives are working better—but still not adequately. The principal justification for controls and incentives today is not that they prevent congestion or successfully induce new growth. It is rather that in a territory containing several development possibilities, a well-designed system of controls and incentives will prompt many firms and ministries to take advantage of these other possibilities.

25. A national system of incentives and controls to reinforce an urban growth strategy can be evolved in many ways. One possibility is to begin at the top, create an intelligence unit close to the chief executive and then develop a national strategy for area development. This is doubtless the most appealing approach from one point of view, for it is certainly possible now, in principle, for a small group of specialists to devise a fairly comprehensive strategy: to spell out goals; to write legislation; to formulate policies; to fashion administrative mechanisms; and to devise means to carry them into effect. Doubtless, this can be done all the more quickly and elegantly if there is a national planning organization. But unless there is a large backlog of experience on these matters, not to mention adequate staff and resources, such efforts are apt to bog down. The ideas will not be fully understood and therefore will not gain the necessary backing in different quarters, especially in the local regions. The programmes in the United Kingdom, the United States, Venezuela and even France did not evolve in this way; and the brief experience of Turkey with planning from the top down suggests that when such an approach is followed, it will not be effective. [11] However simple and direct the centralized style may appear, the lack of an adequate analytical, administrative and political base outside the political centre often turns out to be a crucial weakness. It would take a rare group of administrators, indeed, to overcome it.

26. An alternative approach is illustrated by the experience of Venezuela or by the later stages of the

[10] The development schemes are mainly investments in infrastructure, industrial estates or joint (public-private) industrial or business ventures. In the main, the incentives to induce private activity take the form of one or more of the following: tax bonuses; inexpensive credit; accelerated depreciation; cash grants; employment; or transportation premiums and exemption from exchange or import restrictions. As noted later in the paper, it is generally essential to have both controls and incentives. Tax incentives and infrastructure investments (particularly in transportation) reinforced with a vigorous public development and land acquisition programme have generally proved to be the most effective combination of measures to implement agreed-on urban development strategies—in countries with reasonable administrative capability.

[11] L. Rodwin, *Nations and Cities*, *op. cit.*, chaps. 3-7.

regional planning programme in Turkey. In these two cases, the emphasis was on promoting one or more metropolitan regions, at the same time, or at some reasonable period thereafter, these programmes were linked into national development plans and policies This approach built up the necessary experience and trained staff and gradually familiarized key elements of the public and the Government with the programme and the issues A basic assumption here is that the essential ideas of the programme have merit and will win further support, that they will survive despite inconsistencies and conflicts between regions and that over time they will generate pressures for complementary programmes

27. Despite the clarity of the goals of a country, political pressures can complicate and dilute the effectiveness of development policies The issue of dispersal or concentration is an illustration of this. In the past, and even today, the pressure to satisfy political requirements hobbled programmes in France, the United Kingdom and the United States of America (not to mention Italy and other countries in western Europe) Dispersal was more effectively resisted in Venezuela, due to a political leadership which created an extraordinary national consensus about an exceptional region; and it was also successfully resisted in Turkey under the leaderships of Kemal and Inonu, but not thereafter In general, however, the free market tends to favour concentration, whereas making the issues explicit often tends to consolidate political pressures and to favour dispersal. Thus, the great task of urban statesmanship is to develop the necessary political imagery to steer a middle course for a reasonable period in the future. This task, however, is extremely difficult. To date, the issue of dispersal or concentration has proved so inflammatory and the way it is resolved so critical to the success of any policy of development that Governments have often found it necessary to talk one way and to act another. And although it is easier politically to advocate dispersal and then allocate resources otherwise (or allow such allocations to occur), the experience of France suggests that, on occasion, this process may be reversed There, "lip service" has been paid to the ideology of concentration, but, as yet, this has imposed very few constraints on a far more permissive allocation policy.

Some cautionary inferences on policy implications

28. Given these broad trends, one may ask what specific inferences might be ventured for decision-makers pondering these issues For discussion purposes, seven propositions warrant further consideration. These propositions can be cast in the form of cautionary observations, which, if the evaluation of these experiences is sound, ought not to be lightly disregarded by anyone concerned with the formulation of policy on these matters

29 The seven propositions are discussed below.

30 The first proposition is that, for the next generation (15-20 years), it is probably not feasible (or desirable) in most developing countries to stop the spread or the growth of population of the giant cities (cities with population of 500,000 or more); but it may well be feasible (and desirable) to lower their rates of growth in relation to the growth rates of other urban centres

31 To the best of the author's knowledge, there are no examples of successful efforts to stop the growth of these giant cities or to reduce their size. The Union of Soviet Socialist Republics failed to curb the growth of Moscow, Mussolini's system of entry permits proved of no avail in arresting the growth of Rome The United Kingdom failed to stop the growth of London France—with the most highly centralized bureaucracy in the western world—has not been able to curb the growth of Paris In most giant cities, the central cities may be growing less rapidly or even losing population, but their outer regions are expanding enormously. Given these deep-seated and pervasive trends, there are scarcely any persuasive grounds for thinking that developing countries will prove more effective in coping with these problems All the evidence suggests they have neither the administrative capability nor the resources, not to mention the will, to succeed in this extraordinarily difficult enterprise

32 One can be a bit more sanguine, however, if the goals are more modest Thus, it may be possible to increase the income and number of jobs in other cities and regions, and to improve their infrastructure and enhance their growth capabilities Some examples exist of progress along these lines: witness the transformation of the western part of the United States of America in the nineteenth century, induced by an extraordinary system of incentives and infrastructure investments, and the similar transformation in the twentieth century of the Soviet Union east of the Urals, or the development of Ankara and the interior of Anatolia in Turkey, all of which have resulted in a far more balanced system of cities than otherwise would have been the case in these countries Similarly, in western Europe in the past generation, there has been increasing sophistication in the efforts to encourage growth in the less prosperous regions of the United Kingdom, in promoting regional equilibrium metropolises in France to offset the growth of Paris, and in encouraging the relative increase of income and the growth of economic activity in the south of Italy—to cite only a few examples Although none of these (and other) efforts are unequivocal success stories—judging from the controversies concerning the incidence of their costs and benefits—they provide some evidence that more modest objectives are or may be obtainable, and perhaps even with reasonable costs

33. The second proposition is that fostering big cities is one of the best means of countering the growth of the giant cities Small cities cannot fight giant cities. It is an unequal match and they are sure to lose Firms in the giant city have a larger and more diversified

manpower pool. Families have more varied and diversified job and cultural and social opportunities. Both firms and families have access to superior business and consumer services. Giant cities concentrate population and income; and they reinforce the habits, the attitudes and the tempo of modern society. They can command critical managerial skills, and they can display a wide variety of role models likely to spark worldly ambition and competitive effort. Most small cities which compete with giant cities do so only when they are within and part of the metropolitan region and can tap all of the advantages of that region while avoiding most of the costs.

34. Existing large cities (those with populations ranging roughly between 100,000 and 500,000) [12] or new large cities can muster more effective resources to compete with the giant city. A small city which loses a few of its economic activities is in a perilous position. A large city, like a large corporation, can use its assets and services to reorganize and transform its economy, its infrastructure and even its environment. A big city can better organize and finance the necessary intelligence functions and development organizations to evaluate its problems, its resource endowment, and its needs, aspirations and development potential. Perhaps the two most dramatic illustrations of this fact today are: (*a*) the changed emphasis of the second generation of British New Towns in the direction of larger size and their use as economic weapons to accelerate growth and reduce unemployment in the north of the country; and (*b*) the recognition by the French Government of the urgent need to promote regional equilibrium metropolises and regional intelligence mechanisms. Such actions alone may be insufficient, but they are surely a step in the right direction.

35. The third proposition is that New Towns and expanded towns should serve, rather than ignore or frustrate, the basic aims of settlement strategies. New communities can easily become a retreat from the problems of the central city. Such new communities are expendable luxuries. Their social value is marginal if they do not specifically reduce the diseconomies and improve the organization of the giant cities or encourage growth centres in lagging regions, especially those with a large unemployed and underemployed population. But these ends will get short shrift if the focus is mainly on the building of one or several New Towns and not on the basic settlement objectives. Most New Towns partisans are so intrigued by the challenge of building new and planned communities that they overlook the fact that any projection of likely New Towns to be built will show that the number is not going to be large and the population to be accommodated will serve only a tiny segment of relatively well to do members of the population. In addition, the research and innovative aspects of New Towns are apt to be greatly exaggerated particularly as the pressure to make them successful drives out high-risk activities and provides powerful reinforcements for conservative judgements as to what innovations will work.

36. Unfortunately, it is not easy to relate new communities either to the immediate or to the long-term needs of the giant metropolis. Most planners and developers think their problems are harrowing enough without having to take on the burdens of existing cities or the problems of depressed areas. What is more, it would be quite a feat to develop a significant programme in which costs are shared nationally, but the visible benefits to particular regions are sharply limited. Certainly, it is much easier to build new communities in high-growth areas where the market prospects are more attractive and interest in innovation (in urban design, transportation and building methods, or in novel health and educational services) is more deep-rooted.

37. Fourthly, if a policy of concentrated decentralization is pursued, the choice of regions is of critical importance and should be related to the goals, constraints and development opportunities, with special concern for equalization and spread effects. Although political considerations will doubtless shape the final outcome, decision-makers need helpful criteria to guide the choice of regions for development—if only to suggest the kinds of compromises that might reasonably be made. Undoubtedly, any extensive development planned for selected regions will take a number of years to promote. Therefore, while tentative programmes may be initiated, based on existing knowledge and pragmatic judgements, more detailed studies can be gotten under way. Then, at some subsequent stage, when one has acquired a better sense of development prospects, these programmes and their planned sequences can be reviewed and either stepped up or contracted. For a variety of reasons, however, the decisions in both the short and long term will be influenced by the relevant goals, constraints and development potentials.

38. Most countries want to maximize growth rates and to increase *per capita* income. But these general goals are subject to a variety of constraints. [13] Some of the more important of these are: minimum levels of consumption; implicit discount rates of future returns; desired distribution (or desired rate of change in the distribution) of income by class and region. Other restrictions emerge from projected defense requirements and from the need for internal consistency in resource allocations, such as specified exchange balances and execution of programmes within available or potentially available resources of capital and of managerial and administrative ability. An even more important limitation today may be a preference for certain ways of carrying out programmes, such as emphasis on de-

[12] For a comparable estimate, see N. M. Hansen, ed., *Growth Centers in Regional Economic Development* (New York, The Free Press; and London, Collier-Macmillan Limited, 1972), pp. 278-279.

[13] The difference between goals and constraints is often moot or meaningless. See R. Dorfman, "Operations research", *American Economic Review*, vol. 50, No. 4 (1960), p. 609; and J. Margolis, "The evaluation of water resources development", *ibid.*, vol. 49, No. 1 (1959), pp. 99-100.

centralization and participation as well as on system maintenance.

39. Studies of market areas, urban hierarchy and metropolitan *hinterlands* also underscore the function of urban growth regions as innovative and economic seed-beds for much larger *hinterlands*. This suggests another important consideration, namely that the region(s) selected for further development should be those which, with relative economy, could improve their access to large, resource-rich or densely populated *hinterlands* To apply this criterion, evaluations would have to be made of the probable cultural and economic consequences of proposed development programmes in different regions In particular, these evaluations would have to consider the number of families affected and the likely changes in consumption and saving patterns and in social and other relationships. To be sure, few of these changes can be traced with precision But, if an essential aim is to transform traditional attitudes and values, it is important to estimate how effectively different regional developments serve this end. [14]

40. Almost needless to say, more refined comparative analysis of the problems of the long-term prospects of the leading regions will also be essential in order to evaluate development alternatives and to make programme recommendations. This would presuppose evaluations of the principal characteristics and capabilities of the population It would involve projections of trends in the main economic activities, in population, income, investment and consumption Knowledge of the demand and supply implications for related activities in the "leading regions" would also be necessary. It would be useful, too, to try to estimate the probable impact of existing national development policies on sectors within the selected regions, as well as the induced effects of the regions' development on the national economy. Where data and circumstances permit, even the currently inadequate and unrealistic interindustry and interregional input-output matrices and programming methods might be employed, if used mainly to direct attention to interacting relationships and significant implications which might otherwise be overlooked

41 The fifth proposition is that although encouraging concentrated decentralization in large cities may be a reasonable policy given the current state of knowledge, it is politically defensible only if there are appropriate complementary efforts to assist other problem regions No matter how justified it might be economically to follow a policy of concentrated decentralization, such a course of action appears to be, and perhaps it even is, essentially unfair and inequitable. There is something fundamentally unjust about the Government helping some areas and neglecting others. Even confirmed pragmatists might balk at a policy of apparent favouritism—sanctioned though it might be by the biblical precept· "To him that hath shall be given". This may be accurate prophecy, and it could well contribute to greater productivity. But in an age when the prevailing ethic favours egalitarian perspectives, it is dangerous and often nearly impossible politically to follow such a course.

42 The question is whether this means that such a policy is essentially non-operational and impractical The answer is· not necessarily There are ways one might invest resources which may be politically prudent as well as economically wise

43 With a little imagination, means might be devised to help people in non-growth regions while mounting major regional programmes elsewhere The population of regions not likely to respond to and therefore not destined to receive significant economic investments ought to obtain alternative forms of assistance consistent with this policy By means of agricultural and community development projects, land reform and self-help schemes, migration to larger cities may be reduced to somewhat more manageable levels. It might also be possible to organize (and perhaps even to subsidize sufficiently the cost of) transportation to bring many families living in lagging regions within reasonable commuting distance of growth centres Much could also be done to ease the shifts of population that must occur Training programmes could be set up, accurate information on expanding areas disseminated, and, where resources permitted, minimum assistance payments provided during the period of relocation Investments in health and education, in social rather than in economic overhead capital might also be emphasized in these regions. [15] Such investments would contribute to development as well as to welfare Lastly, some areas might only need help for a short period or might require more moderate assistance, whereas in other areas some uneconomic investments and tax bonuses might be inescapable In short, some positive and some token efforts and a great deal of consumate political skill are essential Success would depend upon the balance struck between economic progress and social welfare, and upon a sensitivity to those repercussions which can upset a theoretically rational development programme

44 The sixth proposition is that national strategies for urban development will be seriously handicapped until the resources and capabilities of local governments are greatly strengthened Currently, almost everywhere local revenues are hopelessly inadequate, pay and [illegible] poor; and local services in education, transport[illegible], housing, recreation, social service and basic [illegible] in need of massive improvements. There are [illegible] reasons why the problems of local capabil[illegible] [illegible] played a major role so far in national po[illegible] [illegible]

[14] For some suggestive notions on the effects of regional developments on traditional attitudes, see D Lerner, *The Passing of Traditional Society* (Glencoe, Illinois, The Free Press, 1958), chap 1, and L R Peattie, *The View From the Barrio* (Ann Arbor, University of Michigan Press, 1968), chaps 10 and 11.

[15] See N M Hansen, "The structure and [illegible] of local public investment expenditures", *Review [illegible]* *Statistics*, vol 47, No 2 (1965), pp [illegible] [illegible] Hansen, *French Regional Planning* ([illegible] University Press, 1968)

to urban growth strategies. In the poorer countries, central Governments have been in no position to transform local government services; nor have these problems been as pressing in the short run as the monetary, exchange, general development or minority problems which have faced the central Governments. Moreover, in most of these countries, there exists no tradition of strong local government. Often, there are powerful landed or regional interests—vestiges of feudalism—which the central Governments are trying to combat. These conditions, coupled with meagre resources and inadequately trained professional staff, have made it unlikely for central Governments to have either the capacity or the desire to strengthen local or regional independence. But overloaded central staffs, and the need to stir local initiative, will eventually spur efforts to solve these problems through some form of decentralization.

45. In the more developed countries, such as France, the United Kingdom and the United States of America, the local governments had, or have acquired, greater responsibilities for territorial planning and development. But even these powers have proved inadequate. The mounting obligations accompanying increases in population, in welfare services and in development responsibilities have compelled persistent efforts on the part of national Governments to strengthen local capabilities. During the past generation, these efforts took the form of matched grants from the central Government for specific services. The current trend is towards enlarging local government boundaries, as in France and in the United Kingdom and towards providing unrestricted block grants to local communities, as in the United States. [16]

46. One effect of these measures will be the weakening of the power of the central Government to guide developmental strategy within the region. If communities do not require financial assistance, they will not be especially receptive to unpopular national policies. However, block grants and changes in boundaries will not alter the need for national efforts to induce desired changes in interregional or intraregional patterns of development. Therefore, national incentives are likely to be increased in order to aid lagging regions, to underwrite urban renewal, to siphon off population growth and industries from congested areas and to support othe programmes favoured by the central authorities.

47. The seventh proposition concerns a basic que tion confronting urban development strategies, that c the way in which to ensure that the groups who shoul benefit from growth shall actually do so. Providin assistance from the affluent regions to the poore regions by way of the central Government ofte ends up with the giver as the principal beneficiary It has therefore been urged that regions, and in particu lar the people of these regions, be given a greater voic in the administrative and political process. Mainl dissident minorities have expressed these views to date but the ideas reflect the mood of the age and are neatl attuned to prevailing circumstances. It is hardly sur prising that they are spreading and bid fair to becom the conventional wisdom of the future.

48. One can see these tendencies in a number o different political and social contexts. For example, i the Guayana region of Venezuela, the dissident stressed the importance of having the Guayana Develop ment Corporation consult the views and needs of th local population—the merchants and political leader and even the humbler elements of society. They wantec a greater emphasis placed on achieving high employment than on attaining a high rate of growth. They favoured low density, more self-help and owner-occupied housing in places where migrants could find jobs and learn more easily about new opportunities. They objected to the criteria used for housing selection and welfare, which some of the local population considered to be inappropriate for many of the families the programmes were intended to serve. A growing awareness of the discrepancy between the needs of the population and the policies of the administrators soon led some of the local leaders to explore ways of effecting change by pressures and other processes and even by violence. [17] Ultimately, on some matters, such as the distribution of public land to the local community, the Guayana Development Corporation was forced to reverse its position in response to the pressures of the local leaders.

49. Other national programmes have also been modified by local demands. In Turkey, despite the disdain for local views and a highly centralized administrative tradition, local and regional pressures have forced more attention to be paid to development in the eastern region, though "participation" is still a long way off. In the United Kingdom, on the other hand, the claims for regional autonomy in Scotland and Wales have been asserted with increasing intensity. In France, even more than in the United Kingdom, the emphasis has changed from simply helping the lagging regions to providing more opportunity for their participation in the decision-making process. These views, expressed often enough before the political disturbances in May and June of 1968, were clearly a reaction to the paternalistic

[16] See, for example, Royal Commission on Local Government in England, *Written Evidence of the Ministry of Housing and Local Government* (London, HMSO, 1967), especially part 2; *Written Evidence of the Department of Economic Affairs* (London, HMSO, 1967), pp. 1-4; United Kingdom, Department of Economic Affairs, *Minutes of Evidence*, 19 January 1967 (London, HMSO, 1967), pp. 3-20; Ecole nationale d'administration, "L'Adaptation de l'organisation administrative française aux problèmes d'aménagement des grandes agglomérations urbaines", seminar directed by P. Voit, Chief of the Urban and Regional Division at the Commissariat Général du Plan, Paris, March 1966, pp. 19-46 (mimeographed); Centre de recherches et de documentation sur la consommation (CREDOC), *Etude méthodologique sur les programmes d'équipements urbains réalisés à ce jour* (Paris, 1961); and V. Bourrel, *Rapport de la Commission d'étude des finances locales à M. le Premier Ministre* (Paris) Imprimerie nationale, 1965).

[17] L. R. Peattie, *op. cit.*, chaps. 6 and 7.

and heavy-handed tutelage of the French administrative process. For a long time, they were dismissed as contrived political pressures encouraged by an intractable opposition; but after the events of May and June, and even after the subsequent elections which gutted the opposition, the Government radically reversed its position and supported the creation of regional assemblies as well as a gradual movement towards eventual fiscal autonomy Moreover, the Government favoured these measures on the grounds that the people in the regions would thereby be more apt to pursue vigorous measures in their own behalf. [18]

50 As for the United States of America, although its long-established pattern of decentralized state authorities has been dwindling in importance, new pressures for more local control have arisen from certain militant leaders of the poor and the black Only such power, it has been contended, will allow vigorous efforts in self-improvement, and only the possession of such power will transform the black population's image of itself and of its status. These views have come to the fore at approximately the same time that several experiments have been undertaken to encourage "maximum feasible participation" by low-income families in a variety of economic development, educational and housing assistance programmes designed to help them improve their conditions The ambiguity of the language and the inadequacies of certain programmes have led some persons to dismiss such efforts as impractical and misguided But it is far from certain that the programmes have failed or that their limitations have been due to inherent weaknesses rather than to inexperience and limited resources. [19]

51 In any case, the evidence seems to suggest that, in the future, urban growth strategies will not be simply efforts of the central Governments to aid lagging regions through incentives and controls These strategies will be characterized by pressures and demands on the part of the populations of these lagging areas and their supporters for a greater share in the planning and administration of policies

[18] L'Equipe de la Revue "2000", *Essai sur la participation, autonomie, et solidarités* No 9, "Special", Paris, June 1968 See also the remarks of the former Prime Minister Couve de Murville and General de Gaulle, cited, respectively, in *Le Monde*, 15-16 December, 1968, p 6, and 4 February 1969, p 2

[19] D P Moynihan, *Maximum Feasible Misunderstanding* (New York, The Free Press, 1969), P Marris and M Rein, *Dilemmas of Social Reform, Poverty and Community Action in the United States*
J A Califano, Jr,
The Washington Po

COMMENTS ON "NATIONAL POLICIES AND EXPERIENCES RELEVANT TO URBAN DEVELOPMENT: AN EVALUATION" *

Kazimierz Dziewonski **

1. Generally speaking, this author is in complete agreement with the seven points on policies for urban and rural development as formulated by Lloyd Rodwin, [1] although for different reasons and sometimes even for opposite ones. The last part of the foregoing statement should not really surprise anybody as the author comes from a country of different social and economic formation and structure, as well as of varying cultural traditions. More surprising, perhaps, is the first part about the complete agreement based both on theoretical reasons and practical experience. Nevertheless, some of the points raised should be amplified. However, at the very beginning, an additional, wider problem should be raised, which, although a little theoretical in formulation, is indeed essential but was omitted by Professor Rodwin.

2. The development policies pertaining to settlement should consider and be directed towards the whole settlement system and not only a single type even though that is the largest class and type of settlement. These policies should be complex and comprehensive. The term "settlement system" is used in this statement in preference to the term "settlement network" to stress the fact that all settlements in any country are interdependent, rather than a purely accidental, random collection of urban and rural settlements, of cities, towns, villages, hamlets or even single farms and homesteads. However, in some countries, specifically in the developing countries, which have only recently gained their national independence, the settlement system may be not fully integrated. It may consist, in fact, of several varying systems, one superimposed upon another. These were created by different social and economic formations, tribal, feudal, capitalist and so forth, as well as by varying national and religious cultures, civilizations and traditions. The national system in these countries is usually composed of at least two not fully integrated systems, one tribal, i.e., local and regional, and the other supranational, representing the rejected colonial economy and society. One of the difficulties in such cases is that, on the one hand, the older, traditional systems represent an antiquated, obsolete economy, while, on the other, the inherited colonial system is the only one functioning at the national level. In such situations national settlement policies have to accept as one of the main goals full integration, in fact the creation of a new national settlement system. But in all cases, with a growing society and economy, some changes in the national settlement system are inevitable; and as all settlements are interdependent, they should lead to a balanced and stable structure for the whole system.

3. To change or to steer and direct changes in a settlement system is not an easy task. The systems, especially in their physical or spatial aspects, are fairly stable, representing in their infrastructures the accumulated efforts and labours of past generations. Sudden, radical changes involve the expenditure of rather large funds that are often difficult to obtain. In most cases the changes are differential in character and slow in time. They need careful steering and long-term, stabilized policies. They have to take into account also some natural, spontaneous trends and the transformation of existing conditions, forms and patterns.

4. Along with the basic, strategic goal of settlement policies which is to obtain an integrated, stable and balanced settlement system, there may be also, indeed there should be, adopted some partial, tactical, short-term additional goals. These goals should be concerned with either specific types or classes of settlement or with individual regions, which play or are to play a leading, dominant role in the transformation and integration of the whole system. In such cases, it is important that the final, strategic goal, the integrated and balanced system, is fully envisaged and constantly kept in mind. The tactical aspects of the temporary, sometimes *ad hoc* and changing short-term policies should not be forgotten either.

5. To develop these parallel, long- and short-term policies, there is a need to define strategic and tactical or operative goals. To adopt proper means for their implementation, it is necessary to identify early in the process both the various superimposed systems in need of integration and the various settlement subsystems, either regional or functional. Among these last, at least three may be mentioned: i.e., large urban agglomerations (called by Professor Rodwin "giant cities"); central places of regional importance (in Professor Rodwin's

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** Deputy Director of the Polish Academy of Sciences, Warsaw.

[1] See Lloyd Rodwin, *National Policies and Experiences Relevant to Urban Development: An Evaluation*, above.

terminology: large cities), and, lastly local urban-rural settlement complexes (containing small or market towns, villages and other smaller rural settlements).

6. On the first point pertaining to the growth of "giant cities" or large urban agglomerations, two aspects, arising out of Polish experience, appear to be worthy of mention. In general, people migrate in search of either employment, perhaps better employment, or improved living conditions, particularly as expressed by better services (in trade, health, education or cultural life) Urban agglomerations always present many opportunities of alternative employment; but, also, being overcrowded they are less attractive from the point of view of living conditions This may explain the fact which should be noted here, that in practically all developed countries large cities currently grow at a higher relative rate than the so-called "giant" ones For the same reason, it is easier to steer the growth of such large urban agglomerations by controlling employment than by administrative restriction on the influx of new inhabitants. In reality, it is the only really effective way. Moreover, the alternative of administrative control over the settlement of new inhabitants within the city leads to some negative social phenomena, such as corruption of officials and a black market in housing

7. Deceleration in the growth of urban agglomerations is therefore possible, but it may easily lead to difficulties and disproportions in the over-all demographic urban structure in the form of a quickly aging population, unable even to reproduce its current number. In conditions of growing economy, a major goal of all national and international policies, does one want to have the largest urban concentrations of population with an aging structure, unresponsive to the challenge of modern technologies, more conservative in its outlook and way of living than, on average, the over-all population of the country? This question is, really, rhetorical The answer has to be negative.

8 So far as Professor Rodwin's second point is concerned, pertaining as it does to the growth of large cities, the regional centres, the present author agrees with him entirely. It seems useful to add here only one observation The regional centres usually play four differing, although complementary and mutually dependent, roles. These are administrative capitals of specific regions, centres of production and services for the surrounding area (central planes in the meaning of W. Christaller's theory), points of concentration for nationally specialized processing industries and important centres for the diffusion and spread of scientific and technological as well as of cultural and social innovations. For the full success of policies directed towards fostering their growth and development, these roles should be constantly kept in mind and provided for in all plans or development programmes. In specific conditions—it is true—the role of a regional centre may be split between different localities, but in such cases, the creation of a strong, quickly growing regional centre and a large city becomes more difficult and involves additional care in planning and programming, as well as in the selection of means for the implementation of adopted policies.

9. The problems of New Towns and the advisability of pursuing the policy of their construction were thoroughly discussed during the United Nations Seminar on New Towns, which was held in London in June 1973 The results, although obviously more detailed, were in complete agreement with reasoning of Professor Rodwin

10 The present author agrees also with his opinion on the critical importance of the choice of regions in the strategy of concentrated decentralization. The way the growth of a large city will stimulate and spread the economic development throughout the whole regional territory has to be studied carefully and planned wisely indeed.

11. The need for complementary efforts to assist other problem regions and to take into account all settlements and their problems is inherent in the very concept of settlement system. Therefore, no further comments need be added to the fifth point made by Professor Rodwin

12 The need for strong local government for the full success of settlement policies is crucial and in reality cannot be stressed too much However, this point should be broadened by including among the partners not only the local authorities, but the local community Other reasons also exist The policies of the central administration sometimes undergo very sudden changes, or, at least, there are some vacillations in their implementation It is the role of the local community and authorities, as representing the social consciousness and public opinion, to insist and to defend the carrying through of an adopted solution right to its conclusion In addition, without the understanding and adoption of the planning goals and aims by the local community, these may easily fail not only because of silent opposition, but solely through lack of proper support

13 Equally important is the point that benefits of urban development should reach those social groups for which they were intended in the beginning This is a very difficult task involving constant observation and control of the plan implementation

14 Among the points made by Professor Rodwin, some recommendations are missing pertaining to the rural (or rural-urban) settlement. There is a very strong interdependence between changes taking place at the level of largest cities and urban agglomeration and those among the smallest settlements, i e., villages and small towns On one hand, in most cases, progress in agricultural production and the well-being of rural population involves serious reduction in the number of persons living in the countryside, and this process may be easily carried too far bringing about the complete depopulation of these areas. On the other, cities grow by immigration—the rate of natural increase being there rather low. The influx of the rural population is needed for their development. If it is cut off, the negative phenom-

ena already mentioned may well develop. The influx may be and, in fact, often is too large, taking place before a sufficient number of jobs and dwellings have been provided. Evidently, the process of migration has to be planned and directed at both ends, in the countryside and in urban areas.

15. Changes in the rural and rural-urban areas also involve the resettlement or at least the regrouping of the population. The communities involved being small and dispersed, it is easy to propose very radical, but not well thought-out solutions. In large cities changes, of necessity (because of their size and complexity), are evolutionary and are conceived as such. With rural settlements, the need for evolutionary measures is often forgotten. However, it is very important, indeed essential.

16. The main problem to be decided on is the measure of either necessary (and possible) concentration or desirable (and feasible) dispersal in settlement. There is no doubt that the technical solutions (agriculture, technology, sanitary equipment, services), favour concentration, but farmers and peasants usually prefer dispersal. The chosen solution, which for various countries, climates and civilizations will probably be very different, may well depend upon the degree in which the urban way of life spreads and is adopted by the rural (agricultural and non-agricultural) population.

17. Returning to the main point of the remarks made in this paper—the importance of interdependence between various settlements whether taken by classes and types or individually—it is appropriate to recall the well-known saying of John .Donne, made famous by Ernest Hemingway, who used part of it for the title of his best novel:

"Any man's death diminishes me, because I am involved in Mankind;

"And therefore never send to know for whom the bell tolls; it tolls for thee."

18. For human settlements, it is true not only in death, but in life.

THE COSTS AND BENEFITS OF ALTERNATIVE SETTLEMENT PATTERNS *

Harry W. Richardson **

1 This paper explores the question of socially desirable patterns of human settlement from the point of view of growth, equity and environmental objectives There is little evidence to support the hypothesis that minimizing the use of natural resources would lead to particular spatial distributions of population, and, therefore, much of the attention is given to the narrower problem of whether large cities generate negative net externalities as a result of environmental disruption and quality of life deficiencies. The answer to this question is the prime determinant of the need for and scope of a national population distribution policy, though it is clear that such a policy would be concerned with much wider aspects than the control of city size. The gist of the argument is that the optimal city-size concept is a chimera, the embodiment of an optimal settlement pattern is impossibly complex and national urban policies should be formulated only with great care Moreover, there are more direct and more effective methods to improve the quality of the urban environment than city-size adjustment strategies. The latter work very slowly, if at all, and are very difficult to implement. In any event, a by-product of such a strategy would be to deprive society of substantial economic, social and cultural benefits.

2. The wide scope of this paper inevitably means generalization, and this masks international differences For instance, migration in developed countries increasingly means interurban movement, while in developing countries, rural-urban flows remain predominant The settlement pattern develops differently according to whether changes are brought about by shifts between city-size classes or by over-all expansion in the urban population. In developed countries, regardless of the social costs and benefits, the private benefits of in-migration into large cities invariably exceed the private costs. In developing countries, this conclusion is less clear because of the possibility of rural expulsion. [1]

3 Apart from the discussion of primacy (see paras 34-36), most of the empirical evidence quoted refers to developed countries In part, this reflects the severe data limitations in developing countries Nevertheless, on *prima facie* grounds, the large cities of developing countries are more likely to generate net social benefits. If the later arguments on primacy are accepted, the social benefits of large cities in relation to small cities are probably stronger in developing than in the developed countries Conversely, to the extent that social costs are a function of industrialization and affluence, they are weaker in developing countries With a few conspicuous exceptions, there is reason to believe that the hypothetical critical city size that equates marginal costs and benefits is greater in developing countries

4 The paper falls into two main parts The first part focuses on the problem of the costs and benefits of city size, particularly at the upper end of the urban scale An outline of the theoretical framework is followed by a discussion of negative, then positive, externalities Lastly, some other considerations relevant to city size are briefly analysed primacy; the market performance of city-size classes, and whether density is a more critical variable than city size The second part broadens out the problem to that of the national settlement pattern as a whole and raises the questions whether there is an optimal spatial distribution and what the implications are for population distribution policy of growth, equity and environmental goals

OPTIMAL CITY SIZE

Theory

5. The notion of an optimal settlement pattern depends heavily, though not inevitably, upon the concept of optimal city size. The latter has received a great deal of attention, primarily as a theoretical concept, but also, and more dangerously, as a guideline for policy prescriptions The standard approach is to draw up sets of hypothetical cost and benefit curves (average and marginal) on a diagram in which city size (population) is measured on the horizontal axis. After an initial decline, the average costs (AC) function is usually drawn as rising more steeply than the average benefits (AB) function [2] Several relevant sizes, frequently interpreted as optima, can be identified

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[1] On the other hand, it would be pointless to control city sizes without attacking the forces inducing the in migration by such measures as land tenure reform

[2] In particular, a common assumption is that $C'(P) > 0$ and $C''(P) > 0$ while $B'(P) > 0$ and $B''(P) < 0$ See also A J Brown *The Framework of Regional Economi the United Kingdom* (London, Cambridge U versity P 2), ued e)

(a) *Minimum threshold* $AB = AC$,
where AB is rising and AC falling;

(b) *Least cost city size:* Min AC;

(c) *Maximum resident welfare:* Max $(AB - AC)$;

(d) *Maximum resident welfare under competition:* Max $\beta\,(AB - AC)$,
where β = a parameter representing the proportion of net benefits remaining with the individual. This modification of (c) reflects the possibility that competitive demand for urban space in a situation where the supply of urban land is imperfectly elastic will result in part of the net benefits being swallowed up in higher land rents.[3] The value of β varies according to demand and supply conditions;

(e) *Maximum gross benefits:* Max AB;

(f) *Social optimum with unlimited population* $MB = MC$,
where MB = marginal benefits and MC = marginal costs. There is no reason why this should be achieved by market forces if the potential migrant makes his decision on the basis of AC and AB;

(g) *Social optimum with finite population:* $MB - OC = MC$,
where OC = opportunity costs of locating the population elsewhere in the system.

6. Even this long list does not exhaust the possibilities, since the optimal city size may be viewed from the perspective of firms as well as households, and firms face a quite different set of cost and benefit functions.

7. To play this optimal city-size game involves several restrictive assumptions: the expression of city size in terms of urban area population; the additivity of all benefits and costs; the neglect of spatial variables in urban efficiency; the identity of interests of all citizens; homogeneity in tastes; and a static framework abstracting from shifts in production functions and from changes in household preferences. Of these, the second assumption is the most critical. Since the cost and benefit functions must, if they mean anything at all, take account of non-monetary costs and benefits (i.e., the social costs, such as pollution, congestion, mental stress and the risks of crime; and the social benefits, such as consumption externalities and business agglomeration economies), the shape of the functions can be known only if these costs and benefits can be specified. Since they cannot be measured precisely in monetary terms, any inference that cities of a certain size are "excessive" or "too small" depends not upon scienti
sifting of the evidence, but upon value judgemen
implicit but untestable weighting assumptions and up
the criteria selected for analysis. For examp
Klaassen[4] based his conclusions on the shape of t
functions on a narrow definition of both benefits (incom
per capita) and costs (operating costs). Others ha
argued for an even smaller optimal size by giving e
cessive attention to the negative, but ignoring the po
tive externalities.

8. Thus, even if the optimal city size concept h
some pedagogical value in a theoretical analysis, it
utterly non-operational for policy purposes. It has oth
objections. The distribution of costs and benefits m
raise more critical issues for urban policy than the
absolute magnitude.[5] The appropriate size for a ci
cannot be treated in isolation from its location in rel
tion to other cities. Indeed, in a polynucleat
megalopolitan structure the distinction between lar
cities and small becomes blurred, because small citi
are frequently part of the large ones. The existence
national urban hierarchies dilutes the idea of a uniq
optimal city size into the much weaker proposition th
there may be an optimum size for a city at a specif
location at a particular point of time and in certa
precisely specified conditions. This leads to the poss
bility of a great many optima, a result which does litt
to simplify the policy-maker's task.[6] In any event, ci
size is too ambiguous a term to be treated as a critic
policy variable in social planning.

Negative externalities and city size

A congestion and externalities model

9. The standard model of externalities (particularl
negative externalities) and city size derives fro
Tolley.[7] If it is assumed that there are increasin
negative externalities with city size, the vertical diffe
ence between *marginal private product* (MPP) an
marginal social product (MSP) widens as employmen
(population) expands. Furthermore, the MPP curve fal
off more steeply. Market forces equate MPPs in citie
In a big city, equilibrium will occur at a larger popu
lation size than if MSPs had been equalized.[8]

10. There are two basic strategies to correct thi
situation. First, a policy of wage taxes and subsidie
may be introduced to equalize wages and MSPs. Thi
improves resource allocation and, within the assump

L. H. Klaassen, "Growth poles in economic theory and policy", in A. Kuklinski and R. Petrella, eds., *Growth Poles and Regional Policies* (The Hague, Mouton and Co., 1972), pp. 1-40; J. L. Barr, "City size, land rent and the supply of public goods", *Regional and Urban Economics*, vol. 2 (1972), pp. 67-103.

[3] M. Edel (1972), "Land values and the costs of urban congestion: measurement and distribution", in Ecole pratique des hautes études, VI[e] section, *Political Economy of Environment: Problems of Method* (The Hague, Mouton and Co., 1972), pp. 61-90.

[4] L. H. Klaassen, *loc. cit.*

[5] R. Kirwan, "The contribution of public expenditure an
finance to the problems of inner London", Centre for Environ
mental Studies Conference on the Inner City, Oxford, 1972
see also M. Edel, *loc. cit.*

[6] For an extensive treatment of the many weaknesses o
optimal city-size analysis, see H. W. Richardson, "Optimalit
in city size, systems of cities and urban policy: a sceptic
view", *Urban Studies*, vol. 9 (1972), pp. 29-48.

[7] G. S. Tolley, "The welfare economics of city bigness"
University of Chicago, Urban Economics Report No. 31, 1969

[8] Tolley ignores positive externalities. If there are net posi
tive externalities, market equilibrium can result in big citie
being too small rather than too big.

tions of the model, reduces the size of large cities. However, as a solution it is second-best, since it leaves the negative externalities intact. A more efficient strategy is to take action to eliminate them by prohibition, taxes or subsidizing investment in abatement. The impact of such steps on the size of large cities is obscure They could lead to a greater upward shift in the MP curves for large cities because of the assumption that externalities are greater there. For example, although pollution and congestion charges raise costs, the higher costs may be more than offset by shifts in production functions

11. The value of this model, particularly as a precise guide for policy, depends upon the crucial assumption that negative externalities increase with city size. One may ask how firm the evidence is for the common assumption that social costs are an increasing function of city size and/or density.[9] It may also be asked how operational such a model is in view of the impossibility of measuring marginal social costs[10] and how one deals with the undeniable existence of offsetting agglomeration economies.[11] Whatever the difficulties of using this kind of framework for policy purposes, of the various control strategies—taxes, decrees, investment in new capacity or in abatement, and direct adjustment of city size—the last is dangerous and probably ineffective Urban size is notoriously "sticky" downwards There are no efficient instruments available to reduce city size sufficiently to have much impact on social costs An advantage of congestion levies is that they are easily reversible and give scope for experiment denied to city-size adjustment strategies

Traffic congestion

12. The rising social costs–city-size function is plausible in respect of traffic congestion[12] Congestion is an inverse function of speed, speed is inversely related to total vehicular flow (for a given road width) and flow is a direct function of city size, hence, congestion is positively associated with city size. Empirically, travel-time involved in work-trips increases with city size.[13] Similarly, peak central business district traffic densities are significantly higher in cities with more than 250,000 population than in smaller urban areas.

13 However, this evidence needs qualification in several respects In cities above the 1 million mark, there may be some decline in traffic densities as mass transit systems become viable Even if firms have no alternative to bearing higher freight and distribution costs apart from moving out of the city, households have much greater freedom for manœuvre in the face of higher traffic congestion costs, by changing homes, jobs or transport modes Congestion costs rise rapidly as road use (demand) increases in relation to design capacity (supply) Thus, if congestion costs are higher in larger cities the reason may be not so much ineradicable social costs or incorrect pricing of transportation services as chronic under-investment in transportation capacity Unfortunately, remedying this situation may give rise to its own problems In some of the world's largest cities, e g , London, plans to expand the road transport system have met adverse public reaction because of environmental side-effects, particularly disturbance to residential-area amenity[14]

Air pollution

14 The problems of urban pollution may be illustrated by the example of air pollution The generation of air pollutants is an increasing function of population size and density, and of industrial concentration. Their effects on the quality of air are cumulative and complex, depending upon the volume and kind of pollutants emitted, their rate of dispersion and on chemical and physical reactions in the air The relationship between pollution and city size, however, is obscure. What counts is the concentration of pollutants, and this is much more a function of density of population, vehicle use, industry etc. than of city size. Consequently, there are wide local variations even within a very small geographical area[15]

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[9] K W Kapp *The Social Costs of Business Enterprise* (Bombay, Asia Publishing House, 1963), *E S Mills* and D M de Ferranti, "Market choices and optimum city size", *American Economic Review*, vol 61 (1971), pp 340 345, K W Kapp, "Environmental disruption and social costs a challenge to economics", *Kyklos* (Bern), vol 23 (1970), pp 833 848, and J Rothenberg, "Economics of congestion and pollution an integrated view", *American Economic Review*, vol 60 (1970), pp 114-121

[10] See the objections raised by J M Buchanan, *Costs and Choice An Inquiry in Economic Theory* (Chicago, Ill, Markham, 1969) Baumol and Oates make a convincing case [illegible]

Oates, "The use of standards and prices for protection of the environment', in P Bohm and A V Kneese, eds, *The Economics of Environment* (New York Macmillan, 1971), pp 53 65 For discussion of the question that a time tax is [illegible]

maximize agglomeration economies See L B Lave, "Congestion and urban location" *Papers and Proceedings, Regional Science Association* vol 25 (1970), pp 133-149

[12] Congestion is understood here as the marginal social costs of travel, rather than in terms of physical flows

[13] See J N Morgan, I A Sirageldin and N Berwaldt *Productive Americans* Survey Research Center, Monograph 43 (Ann Arbor, University of Michigan, 1966), and A M Voorhees and others, "Factors in work-trip lengths", *Highway Research Record*, No 141 (1966), pp 24-26 Even with a moderate valuation of travel time the travel cost differential between adjacent city-size classes has been estimated at about 1 per cent See I Hoch, 'Income and city size", *Urban Studies* vol 9 (1972), pp 299-328

[14] For example, see United Kingdom, Department of the Environment, *Greater London Development Plan, Report of the Panel of Inquiry* (Her Majesty's Stationery Office, 1973), vol 1, chaps VIII-XV

[15] For the very large variations in air pollution within Greater London, see Warren Spring Laboratory *National Survey of Air Pollution, 1961-71* (London [illegible] Majesty's Stationery Office 1972)

Climate and industrial structure are more important than city size; hence, regional variations in air pollution are much wider than intercity variations. [16] The differences between urban and rural areas are also very wide, compared with city-size class differentials, which fail to show a clear positive relationship. Seasonal variations within a city tend to be greater than the annual average differentials between cities. The association between air pollution and population density is stronger than that with either central city or urbanized area population. [17]

15. Paradoxically, in the developed countries, increasing concern with air-pollution problems has coincided with a significant decline in emissions over time. Not that this fact infringes the case for controlling air pollution. Lave and Seskin [18] have argued from evidence in the United States of America that a 50 per cent reduction in air pollution could lower the economic costs or morbidity and mortality by 4.5 per cent and increase the life expectancy of a new-born child by 3-5 years.

16. The question may be asked concerning the implications of the empirical evidence on urban air-pollution characteristics for pollution control. First, it would be futile to tamper with city sizes as a means of dealing with air pollution since it would also be necessary to change radically and simultaneously the density and structure of urban areas. A second and preferable strategy to influence the spatial distribution would be to encourage the decentralization of high-pollutant industries. Another palliative, no more than that since it can only affect future patterns, is to take account of direct and indirect air-pollution costs in selecting sites for new production plants. To deal with prevailing pollution levels more immediate measures are needed. These include setting nationally determined environmental regulations [19] and market incentives, e.g., emission fees and subsidies for pollution-abatement investment.

Psycho-social stress

17. One may ask whether psychological stress, alienation, social disorganization and higher propensities to be mentally ill are among the disadvantages of city size. This is an important question, though one on which this paper can offer only a lay assessment. In any event, it is generally recognized that the propositions are hard to test, while the evidence is sparse and conflicting. [20] Since costs due to stress cannot be measured, they are frequently exaggerated and given an absolut sacrosanct value.

18. Some observers have emphasized the favourab effects of family life in small towns. [21] Others ha argued that small-town life can be as alienating as li in big cities. [22] Even if the big city is a source of stres one may ask how this stress can be balanced against i attributes as the fount of civilization. A few analysts have quoted evidence on locational preference surve which, together with numerous Gallup polls in man countries, indicate a preference for living in small town but answers to hypothetical questions of this kind a notoriously unreliable. Much of the argument h revolved around the relative impact of high urban popu lation densities and overcrowding; and Jacobs, among others, has argued the need to make a fir distinction between overcrowding (persons per roon and high population densities (persons per acre). Th evidence in both cases is unclear. A study of Honolul found that population per acre was more closely relate than overcrowding to social disorganization mea sures. [25] On the other hand, Winsborough discovered n relationship with gross population density in Chicag after correcting for other socio-economic variables, an Mitchell's study of Hong Kong revealed no associatio between density and measures of strain and stress. [26]

19. Direct studies of the connexion between over crowding and psycho-social stress have been even mor equivocal. Too many studies have been based on ex trapolations to humans from laboratory experiment with animals. [27] Other research has suggested an invers

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[16] For the United States of America, see United States Department of Health, Education and Welfare, *Air Quality Data* (annual) (Washington, D.C., Government Printing Office).

[17] I. Hoch, *loc. cit.*

[18] L. B. Lave and E. Seskin, "Air pollution and human health", *Science*, vol. 167 (1970), pp. 723-732; *idem*, "Health and air pollution", in P. Bohm and A. V. Kneese, eds., *The Economics of Environment* (New York, Macmillan, 1971), pp. 119-138.

[19] These regulations may provide a spur to technological advances, e.g., motor-car engine-emission standards proposed for 1975 by the federal Government of the United States of America.

[20] For a general survey, see G. Carlestam and L. Levi, *Urban Conglomerates as Psycho-Social Human Stressor* (Stockholm, Swedish Preparatory Committee for the Unite Nations Conference on the Human Environment, 1971).

[21] W. F. Ogburn and O. D. Duncan, "City size as a socio logical variable", in E. W. Burgess and D. J. Bogue, eds *Contributions to Urban Sociology* (Chicago, Ill., University o Chicago Press, 1964), pp. 129-147; O. D. Duncan, "The opti mum size of cities", in J. J. Spengler and O. D. Duncan, eds *Demographic Analysis* (New York, Free Press, 1956), pp 372-385; R. M. Lillibridge, "Urban size: an assessment", *Lan Economics*, vol. 28 (1952), pp. 341-352.

[22] W. Alonso, "What are new towns for?", *Urban Studies* vol. 7 (1970), pp. 37-55.

[23] D. W. Rasmussen and C. T. Haworth, "Consumer pre ference and city size", Tallahassee, Florida State University 1971, mimeographed; N. M. Hansen, "A growth center strateg for the United States", *Review of Regional Studies*, vol. (1970), pp. 161-173; D. O. Price, *A Study of the Economi Consequences of Rural to Urban Migration*, United State Department of Commerce, Bureau of the Census (Washington D.C., Government Printing Office, 1969).

[24] Jane Jacobs, *The Death and Life of Great American Citie* (New York, Random House, 1961).

[25] R. C. Schmitt, "Density, health and social disorganization" *Journal of the American Institute of Planners*, vol. 32 (1966) pp. 38-40.

[26] R. E. Mitchell, "Some implications of high density housing", *American Sociological Review*, vol. 36 (1971), pp 18-29; H. W. Winsborough, "The social consequences of high population density", in T. R. Ford and G. F. Dejong, eds., *Social Demography* (Englewood Cliffs, New Jersey, Prentice-Hall, 1970).

[27] P. Marler and W. J. Hamilton, *Mechanisms of Animal Behaviour* (New York, John Wiley & Sons, 1966); J. B. Calhoun, "Population density and social pathology", *Scientific American*, February 1962, pp. 139-149; D. Lindburg, "Observations of rhesus macaque in natural habitats", 1969, mimeographed.

relationship between friendliness and city size.[28] More seriously, some epidemiological studies have found that the incidence of schizophrenia, neuroses and personality disorders is much higher in big-city slums.[29] However, this finding is difficult to interpret. Diagnosis rates may be higher in large cities. Also, it is unclear whether the higher incidence is due to the nature of social life in large cities or to some "drift" theory, i.e , a tendency for people with personality disorders to drift downwards into the poor neighbourhoods of large urban areas

20 Overcrowding, high densities, pollution and noise may generate unfavourable psychological reactions that fall short of disease-inducing stress However, these reactions differ according to social class, emphasis of the problem in the mass media and between individuals.[30] To the extent that there is empirical evidence on these questions, most of the emphasis has been on urban and rural differentials rather than on variations by city size

21 Much more research needs to be done in this field. Even accepting the flimsy evidence in favour of the psycho-stress hypothesis at its face value, a question arises concerning the way in which these costs are to be balanced against the social and cultural attractions, not to mention the economic benefits, of the metropolis Psycho-social stress arguments do not provide a case for a smaller "desirable" size of settlement as a guideline for national urban policy.

Crime

22. The association between increased urbanization and higher crime rates is well known, but the causal relationships are difficult to disentangle. Furthermore, crime statistics are very unreliable and hard to interpret Nevertheless, in both the United States of America and the United Kingdom of Great Britain and Northern Ireland, for example, there is some evidence of a positive association between crime rates (serious crimes per 100,000 population) and city size. In the United Kingdom, crime rates are fairly similar in cities of over 200,000 population, though much lower in smaller towns.[31] In the United States, the decline in crime rates with decreasing city size is more regular,[32] though there is little difference between Standard Metropolitan Statistical Areas within the range of from 750,000 to 3 million

23. Other aspects of the spatial incidence of crime in the United States obscure the city-size effect. The incidence of crime is much lower in rural than in urban areas, only about one third of the national average for serious crime. Within cities, the differential between central city and suburban crime is much wider than the interurban differentials, although suburban crime is becoming more prevalent. Within the central city, the heaviest concentration of crime is found in slum areas and in neighbourhoods troubled by social disorganization, i e, in the ghettos. However, it is difficult to separate the racial effect from the city-size effect[33] The higher economic costs of crime bear most heavily on the white high-income groups, but the poor (in the United States, especially the blacks) suffer most from the social costs

24. The links between crime and population density are very complex A few crimes (rape, assault, burglary) are lower in dense areas, and, some spread-out cities (e.g , Los Angeles) have very high crime rates

25 Little doubt exists that there is a correlation between city size and crime, but the association is not very impressive Certainly, as with the other social costs, there is no case for Utopian social engineers to prescribe physical planning or urban size-policy solutions to the crime problem

Positive externalities

Agglomeration economies

26 Although much of the emphasis in the city-size literature is on social costs, the social benefits of city size should not be neglected, in spite of the fact that their impact is, if anything, more difficult to measure Urban agglomeration economies include higher incomes, scale economies in the public sector (probably exhausted at a relatively small city size); a stable, diversified and highly productive economic structure; consumption externalities; and communication economies A useful distinction may be drawn between business, household and social agglomeration economies.[34]

[28] D A Hambur[illegible] sive behaviour", in [illegible] *The Psychosocial* [illegible] (London, Oxford [illegible] Zimbardo, "The [illegible] and chaos", in W. J [illegible] *Motivation* (Lincoln, [illegible] S Milgram, "The ex- [illegible] 167 (1970), pp 1461- [illegible] Fried and P. Gleicher, "Some sources of residential satisfaction in an urban slum", in H M Proshansky, W H Ittelson and L G Rivlin, eds, *Environmental Psychology: Man and His Physical Setting* (New York, Holt Rinehart and Winston, 1970), pp. 334-335

[29] B P Dohrenwend and B S Dohrenwend, "Psychiatric [illegible]

[30] [illegible] noyance and complaint reactions to environmental noise", paper prepared for the Fourth Karolinska Institute Symposium on Environmental Health, Stockholm, 1971

[31] See F H. McClintock and N H Avison, *Crime in England and Wales* (London Heinemann, 1968) It is not possible to examine city-size differentials for very recent years because of large-scale amalgamation of police forces

[32] United States of America, Federal Bureau of Investigation, *Uniform Crime Reports for the United States* (annual) (Washington, D C).

[33] The black ghetto resident is perhaps 100 times more likely to be a crime victim than is the white suburban resident

[34] H W. Richardson, *Regional Growth Theory* (London, Macmillan, 1973).

27. Business agglomeration economies refer to the wide range of externalities associated with large cities that accrue to individual firms. They include: access to specialized business services; sources of capital; labour market economies (more varied skills, greater elasticity of labour supplies, superior training, better organized placement services); a larger stock of managerial and professional talent; the presence of facilities, e.g., good public services, a pleasant environment, cultural amenities likely to attract professional and high socio-economic status groups; opportunities for specialization offered by a large market (product specialization, technical externalities, transport cost savings); economies in water-supply and perhaps in other public services; information and communication economies (especially for face-to-face contact); greater adaptability and flexibility in the use of fixed capital (particularly structures); and the presence of business entertainment facilities.

28. Among household agglomeration economies, mention should be made of the opportunities for earning higher incomes, a wider choice of jobs, shopping facilities, quality of public services, leisure and cultural amenities and variety in housing. There are undoubtedly threshold city sizes in the efficient provision of educational facilities, public transportation, hospitals, leisure and entertainment opportunities, and in other types of social infrastructure; but there may be a levelling-off in many benefits at the medium-size range. Moreover, some amenities (e.g., climate, access to recreational areas of natural beauty) bear no relationship to city size.

29. Social agglomeration economies are more nebulous, though possibly more important. These economies refer to the systematic functions of large cities and their contribution to national economic growth. Foremost among these functions are the incubation of new industries and their subsequent "filtering-down" [35] to smaller cities and the role of large cities as centres of innovation and as the initial source of hierarchical diffusion. [36]

30. Although these paragraphs provide little more than a list of the positive externalities of urban scale, the length of the list is in itself a reflection that these benefits need as much analysis as the more newsworthy social costs. Unfortunately, there have been very few concrete conclusions on how these economies should be measured and on their precise variation with city size. However, from the systemic externalities point of view, there are clear-cut policy implications: any attempts to control the size of the countı cities; and intervention to boost the size of the urban centres of backward regions in order to rank in the national urban hierarchy. [37]

Income and welfare

31. The income data in developed countri that both money incomes and the cost of livin with city size, [38] but that the income variations so that real incomes increase with city size. important prop in the argument that big-c confers private benefits. On the other ha analysts [39] have argued that the persistence o income differentials despite convergence c supports the "compensating payments hypoth that workers in large cities have to be paid hig to compensate them for negative externaliti ever, an alternative explanation is the effects mittent shifts in production functions.

32. *A priori*, urban growth might be expe associated with income inequality because c gressive effects of rising population and the de land on urban rents. In fact, there is little evid link between urbanization and poverty. In tl States, the incidence of poverty is two and a l greater in non-metropolitan than in metropoli while within cities it declines steeply with incre size. [40] Relevant data are much scarcer in otl tries, but casual empiricism suggests the same The myth of big-city poverty is probably exp the large numbers of poor living in large cities heavy spatial concentration. A plausible ex of the correspondence between income equ city size is Kuznets' hypothesis that income e

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[35] W. R. Thompson, "Internal and external factors in development of urban economies", in H. S. Perloff and L. Wingo, eds., *Issues in Urban Economics*, for Resources for the Future (Baltimore, Md., Johns Hopkins Press, 1968), pp. 43-80; *idem*, "Urban economic growth and development in a national system of cities", in P. M. Hauser and L. F. Schnore, eds., *The Study of Urbanization* (New York, John Wiley, 1965), pp. 431-490.

[36] B. J. L. Berry, "Hierarchical diffusion: the basis of developmental filtering and spread in a system of growth centers", in N. M. Hansen, ed., *Growth Centers in Regional Economic Development* (New York, Free Press, 1972), pp. 108-138; P. O. Pedersen, "Innovation diffusion within and between national urban systems", *Geographical Analysis*, vol. 2 (1970), pp. 203-254.

[37] The justification is that this may promote botl efficiency and interregional equity.

[38] For the United States of America, see G. M *Economic Policy and the Size of Cities* (Canberra, National University Press, 1965); V. R. Fuchs, *D in Hourly Earnings by Region and City Size, 1959*, paper 101 (New York, National Bureau of Ecor search, 1967); K. Mera, "On the urban agglomer economic efficiency", *Economic Development and Change*, vol. 21 (1973), pp. 309-324; J. C. Brackett Lamale, "Area differences in living costs", *American Association, Proceedings of Social Statistics Secti* pp. 144-148; E. Ruiz, "Urban family budgets u autumn 1971", *Monthly Labor Review*, June 1972, W. Alonso and M. Frajans, *Cost of Living and I Urban Size*, working paper No. 28 (Berkeley, In Urban and Regional Development, University of 1970); D. Shefer, "Comparable living costs and ur a statistical analysis", *Journal of the American In Planners*, vol. 36 (1970), pp. 417-421; I. Hoch, *loc.*

[39] The dynamics of cost-of-living changes have b explored. One study of 56 cities in the United States of showed that prices tend to rise faster with increasing See R. C. Bahr, M. R. Meiners and T. Nakayam consumer price indices by size of city", *Monthly Labo* August 1972, pp. 3-8; I. Hoch, *loc. cit.*; M. Edel, *loc*

[40] O. A. Ornati, "Poverty in the cities", in H. S. Pe L. Wingo, eds., *Issues in Urban Economics*, for Reso the Future (Baltimore, Md., Johns Hopkins Press, 1 335-362; M. Orshansky, "Counting the poor", *Social Bulletin*, vol. 28 (1965), pp. 3-29; similarly, the ratio to low-income households increases markedly with c

functionally related to the average income level; this hypothesis was supported in a test of 207 Standard Metropolitan Statistical Areas.[41]

33. A disadvantage offsetting these income benefits may be a tendency for unemployment to be higher in large cities, especially for males.[42] It is also a common occurrence to find high unemployment rates in rapidly growing cities, i e, a positive association between unemployment and net in-migration.

Primacy

34. Primacy occurs when the largest city in the urban system accounts for a much higher proportion of the total urban population than would be predicted from applying the more regular (rank-size, Pareto or lognormal) distribution formulae. Precise criteria and cut-off points are arbitrary However, whatever definitions are used, many Latin American countries exhibit primacy, as do several Asian and a few European countries In developing countries, primacy is frequently a pejorative term. However, it is more sensible to regard primacy as a symptom of problems of population distribution, e g, the failure of agriculture to support rapidly growing populations and the absence of intermediate-size manufacturing and service cities, rather than as a cause. Whatever the diseconomies of urban scale in developing countries, they may be less unpleasant than the alternatives To attempt to check the growth of large cities while neglecting the problems that induce their rapid growth may make matters worse.

35. The connexion between primacy and level of development is not clear-cut,[43] though few countries where primacy occurs are mature industrial economies El Shaks argued that primacy is rare in the least developed of the developing countries, rises during rapid industrialization and declines thereafter; this is an urban-system equivalent of Friedmann's centre-periphery model of regional development.[44] Evidence has been found of positive association between primacy and population growth, export dependence and ex-colonial status and a negative association with size, *per capita* income and industrialization [45]

36. The equating of primacy with parasitism owes more to value judgements than to fact.[46] Indeed, in most cases, primacy has economic advantages· a higher social return to investment than at alternative locations; transportation advantages, economies of concentrating urban services in a capital-poor economy, the primate city has a key role as a source of innovation and managerial expertise and as a diffusion centre for modern attitudes as well as technical advances.[47] A recent study of 46 developing countries reveals quite a strong positive relationship between the economy's aggregate growth rate and increasing primacy.[48] All this suggests

tion policy that discriminates against large cities If such a policy were to be implemented, other objectives, such as interregional equity, would have to provide the justification

The market test of city size

37. Presumably, households and firms have moved to (or stayed in) large cities because it was beneficial and profitable for them to do so The question may be asked if one can, therefore, use the outcome of market forces as a test for the attractiveness of different city sizes. Such a hypothesis would require assuming no bars to mobility and competition between city-size classes for people and jobs If, in the limiting case, one could assume no external economies or diseconomies; and, given the high correlation between the net movement of households and firms, it would be reasonable to argue that the size class which increases its population fastest is the most efficient from the societal point of view The counter-arguments to this analysis are that the assumption of no externality is invalid and that even if large cities conferred net benefits in the past this may no longer be true today In the latter case, locational inertia and the "locked-in" phenomenon may prevent a readjustment in city size in the absence of intervention

38. One may ask how large cities fare in the market

[41] For the Kuznets' hypothesis, see S Kuznets, "Economic growth and income inequality", *American Economic Review*, vol 45 (1955), pp 15-19 For the test of the hypothesis, see H. E French III and L S Burns, "Metropolitan interpersonal income inequality a comment", *Land Economics*, vol 47 (1971), pp 104-106

in female labour markets

[43] B J L. Berry, "City size distributions and economic development", *Economic Development and Cultural Change*, vol 9 (1961), pp 573-587

[44] S El Shaks, "Development, primacy and the structure of cities", unpublished doctoral dissertation, J Friedmann, *Regional Development Policy A Case Study of Venezuela* (Cambridge, Mass, Massachusetts Institute of Technology Press, 1966)

[45] A S Linsky, "Some generalizations concerning primate cities", *Annals of the Association of American Geographers*, vol 55 (1965), pp 506-513 See also W P McGreevey, "A statistical analysis of primacy and lognormality in the size distribution of Latin American cities, 1750-1960", in R M Morse, ed, *The Urban Development of Latin America* (Stanford, Calif, Center for Latin American Studies, Stanford University Press, 1971) McGreevey demonstrates that the emergence of primacy in Latin America in the nineteenth and twentieth centuries could be linked with export growth

[46] W Alonso, "Urban and regional imbalances", *Economic Development and Cultural Change*, vol 17 (1968), pp 1-14

[47] F. Herrara, "Nationalism and urbanisation in Latin America", *Ekistics* (Athens), vol 32 (1971), pp 369-373. Herrara argues that the metropolises of the larger Latin American countries are still not big enough A size of from 5 million to 6 million may be appropriate to create the conditions needed to justify the development of intermediate manufacturing cities

[48] K. Mera, *op cit*

test. Davis [49] showed that very large cities (over 8 million) grew more slowly than the others in the 1960s, but all the other size classes between 100,000 and 8 million increased at a similar rate. Alonso and Medrich [50] found in the United States that spontaneous growth centres (SGC) occurred throughout the size hierarchy. A frequently confirmed generalization is that growth rates for large cities are skewed to the right (either high or stable), [51] whereas smaller towns experience much wider deviations in their growth-performance, ranging from high positive to negative values. [52] Further, evidence in the United States for another indicator—increase in *per capita* income—shows that the big cities did as well as the small.[53]

39. On the whole, the large cities perform rather well. Nevertheless, it may be possible to salvage the pessimists' case. First, there may be unfavourable distributional effects in large cities (though the incidence of poverty is inversely related to city size). Secondly, in-migration may reinforce negative externalities, though not enough to force out existing residents. The trouble is that more research has been carried out on the negative than on the positive externalities. Also, many negative externalities are monetized (the "compensating payments" component in big-city incomes) [54] and though external to individual firms and households are internal to the urban economy as a whole. Thirdly, urban services and costs may be improperly priced, thereby encouraging excessive in-migration. In particular, migrants may pay only the average costs-per-unit increase in households, while the related marginal costs increase with city size. Although this argument may be valid, it involves several untested assumptions: that marginal costs do increase with city size; that the divergence from optimality could be eliminated by correct pricing; and that marginal social benefits are negligible or constant or decline with city size.

Density

40. In population distribution analysis and policy, population-density may be as relevant a variable as aggregate city size. For instance, there is some evidence that many external diseconomies (e.g., pollution, congestion) are a function of population density (especially central-city density) rather than of city size. Conversely, the provision of public services and certain types of social infrastructure is costly at very low densities. [55] This suggests the possibility of a U-shaped function relating urban costs to population density. Some analysts [56] have argued that the concept of optimal density has some value. However, it is difficult to know what to make of such a concept since densities vary so widely within as well as between cities. [57] Just as the frequency distribution of cities casts considerable doubt on the validity of an optimal city size, so the spatial distribution of urban population densities throws suspicion on the usefulness of the "optimal density concept". [58] Although there are wide differences in central-city densities (and average densities) between developed and developing countries, [59] it is probably the intra-urban differences which have the most significant welfare effects. If high central densities imply heavy social costs, while low suburban densities confer higher levels of individual welfare (more space, cleaner air, easier access to open space), the wide income differentials between central city and suburbs are reinforced by density externalities. The solution to this intra-urban problem cannot be found in city-size adjustment strategies; but requires intra-metropolitan measures, e.g., extensive fiscal redistribution.

THE SETTLEMENT PATTERN

An optimal spatial distribution

41. The finding that the notion of a unique optimal city size is absurd is encouraging for city-size distribution analysis, since these distributions are, broadly speaking, hierarchical, indicating variability in size and a degree of regularity in the relationship between size-classes. It may be asked whether there is an optimal city-size distribution or an optimal spatial distribution of cities. Furthermore, accepting the importance of rural populations in some countries, it may be asked whether there is an optimal spatial settlement pattern.

42. Leaving aside the rural population question, a common method of expressing the urban population is in terms of a statistical distribution function. Of the alternatives, one of the simplest expressions is a rank size distribution, $R = kP^{-q}$, where R = city rank, P = city size and k and q = parametric constants. The value of q throws some light on the structure of the urban system: $q = 1$ indicates the famous rank-size rule; [60]

[49] K. Davis, *World Urbanization, 1950-1970*, vol. 2 (Berkeley, Calif., University of California Press, 1972).

[50] Spontaneous growth centres were defined as urban centres with net in-migration rates of more than twice the national average. See W. Alonso and E. Medrich, "Spontaneous growth centers in twentieth century urbanization", in N. M. Hansen, ed., *Growth Centers in Regional Economic Development* (New York, Free Press, 1972), pp. 229-264.

[51] This phenomenon has been described as the "growth stability hypothesis". See W. R. Thompson, "Urban economic growth and development in a national system of cities", *loc. cit.*

[52] In part, this wider dispersion is to be expected merely on statistical grounds.

[53] "Metropolitan area income in 1970", *Survey of Current Business*, vol. 52, No. 5 (1972), pp. 27-44.

[54] I. Hoch, *loc. cit.*; G. S. Tolley, *loc. cit.*

[55] P. Treuner, "An infrastructure cost model of a system of central places", *Papers and Proceedings, Regional Science Association*, vol. 24 (1970), pp. 85-101.

[56] For example, W. F. Smith, *Housing: The Social and Economic Elements* (Berkeley, University of California Press, 1970).

[57] E. S. Mills, *Studies in the Structure of the Urban Economy*, for Resources for the Future (Baltimore, Md., Johns Hopkins Press, 1972); J. L. Barr, *Transportation Cost, Rent and Interurban Location* (St. Louis, Mo., Department of Economics of Washington University, 1970).

[58] H. W. Richardson, *The Economics of Urban Size* (Farnborough, United Kingdom, Saxon House, 1973).

[59] C. Clark, *Population Growth and Land Use* (New York, Macmillan, 1967).

[60] The rule states that the product of city size and its rank is a constant equal to the size of the leading city in the system.

$q > 1$ suggests metropolitan dominance, while $q < 1$ points to an urban system in which there are large intermediate cities, and the limiting cases $q = \infty$ and $q = 0$ represent systems in which there is only one city and where all cities are the same size. Some analysts have argued that the rank-size rule represents the most probable outcome of a stochastic process [61] Even if this were so, and it has been challenged, there is no reason why the most probable distribution should be optimal [62]

43 In any event, city-size distribution parameters are too crude a measure of population distribution. They shed light only on relative, not absolute, size; the problem of "too many?" or "too few?" is different from that of "too big?" or "too small?" They ignore space, a fatal defect in the analysis of national settlement patterns Clearly, a city of 150,000 which is in the suburbs of a giant metropolis is a quite different phenomenon from a central place of the same size in a rural region It is possible to compute theoretical interurban distances, [63] but observed distances deviate widely from these The finding that the size distribution is very stable over time may be more a reflection of the crudeness of how it is measured than an indication of immobility in the urban system Lastly, ignoring the rural population is a limitation in many countries where the major functions of urban centres may be to service nearby rural areas [64]

44 Unless attention is confined to a very abstract model (e.g., Losch's assumption of a homogeneous plain over which resources are uniformly distributed), there is a wide range of alternative distributions of population in both spatial and size terms compatible with efficiency and social objectives. Even if a single dominant goal is assumed (e g , efficiency, equity, environmental quality), it is impossible to determine the population distribution that best satisfies this goal. This question is discussed below. In any event, the capacity to alter the existing population distribution in order to make it conform to some preferred alternative is strictly limited. Furthermore, even if some population settlement-patterns are preferable to others, this is difficult to determine [illegible] population distribution, the production technology (which determines economies of scale in industry and the structure of transport costs), [65] locational constants and random factors. Provided that policy objectives are broad in scope, it may be possible to identify an unsatisfactory settlement pattern and to improve it gradually. This is more realistic, as well as being more modest, than attempting to determine an optimal spatial distribution In a dynamic context, and over heterogeneous space, such an optimal distribution is at best very complex, perhaps impossible

Population distribution policy and economic growth

45 The population distribution that results from the operation of market forces is reasonably efficient in the narrow economic sense of promoting a high rate of growth in gross national product Resource allocation may be improved by subsidizing positive and taxing negative externalities, and such intervention might bring about some realignment in the city-size distribution. However, apart from the fact that a taxation-subsidy strategy on these lines is currently unfeasible, it is unlikely that the over-all city-size distribution would look markedly different The evidence suggests that private returns to labour and (probably) to capital are higher in large cities. As previously remarked, the primacy-growth rate link appears to be fairly strong, at least in developing countries. The national urban hierarchy, and a hierarchical city-size distribution, is the outcome of market forces, is an efficient form of population distribution and spatial organization for the achievement of growth goals If growth goals justify a case for intervention, the case is most strongly based on the time-horizon over which gross national product is to be maximized A very long time-horizon may justify action now to promote the growth of the major urban centres of backward regions in preference to the more concentrated and polarized pattern of development resulting from short-term market forces. In this case, intervention may be more efficient by redistributing population along a superior path of adjustment towards the more dispersed pattern of national settlement that would eventually develop in the market economy.

Population distribution policy and equity goals

46 If the economy is viewed in terms of continuous space rather than as divided into a set of arbitrary regions (each of which is assumed homogeneous and lacking spatial differentiation) the concept of spatial equity becomes very blurred. Equity problems may arise at the intra-urban, interurban (intra-regional) and interregional levels. One may ask whether urban size-

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[61] For an argument in support of the rank-size rule, see L Curry, "The random spatial economy, an exploration in settlement theory", *Annals of the Association of American Geographers*, vol 54 (1964), pp 138-146. For a criticism of this approach, see P Fano, "Organisation, city size distributions and central places", *Papers and Proceedings of the* [illegible] number of cities

[62] H W Richardson, "Optimality in city size, systems of cities and urban policy a sceptic's view", *loc. cit*

[63] See A Losch, *The Economics of Location* (New Haven, Conn , Yale University Press, 1954); L Curry, "Central places in the random spatial economy", *Journal of Regional Science*, vol 7 (1967), pp 217-238, C T Stewart, Jr , "The size and spacing of cities", in H Mayer and C F Kohn, eds , *Readings in Urban Geography* (Chicago, Ill , University of Chicago Press, 1959), pp 240-256

[64] It is interesting that the standard central-place hierarchy model is built upon a rural population base See M J. Beckmann, "City hierarchies and the distribution of city sizes", *Economic Development and Cultural Change*, vol 6 (1958), pp 243-248

[65] The spatial distribution of population and economic activities reflects economies of scale (lower bounds) and transport costs (upper bounds) which stratify population into a hierarchy of cities and settlements and determine the number and size of urban places at each level.

policies can be used to pursue equity objectives. The answer is "not very easily". For instance, growth-centre strategies in backward regions certainly promote interregional equity, but may have adverse effects on intra-regional equity. Moreover, it is dubious whether attempts to check the growth of large cities are desirable from an equity point of view. As pointed out above, poverty indexes and measures of income distribution suggest the contrary. On the other hand, the absolute gap between the very rich and the more numerous very poor is probably wider in the large city. Furthermore, rapid urban growth may bring about changes in the relative price structure (e.g., higher land values) which may regressively shift the functional distribution of income. The ambiguities and contradictions involved in pursuit of equity goals in a spatial context indicate that such goals are far better tackled by redistributive fiscal and wage policies rather than by tampering with city sizes.

Population distribution policy and environmental goals

47. Environmental goals are assuming increasing importance among the social and economic policy objectives of most countries, whether developed or developing. However, it may be argued that the relationship between population distribution and environmental resources is more satisfactorily examined and dealt with at the aggregate level, in the sense that it is unclear whether alternative settlement patterns will have significant differential effects on the use of environmental resources. Of course, as already observed, the degree of population concentration may have effects on the urban environment and quality of life (e.g., air pollution, visual satisfaction derived from the built environment, noise and stress due to overcrowding). Even in these cases, however, it is arguable that attempts to alter the settlement pattern are inappropriate. Such action may be unfeasible in a given institutional environment or may work much too slowly. Technical solutions and/or institutional change are a more direct and more effective method of dealing with environmental externalities than physical planning or national urban policy prescriptions. To the extent that any spatial modifications are desirable, planned decentralization within a polynucleated metropolitan area is more feasible than diverting population to smaller, distant urban areas.

48. Some environmentalists argue that particular population settlement patterns minimize the strain on environmental resources. Apart from the self-evident fact that uniformly low densities of people and industries would reduce the adverse impacts of environmental disruption due to concentration, it is difficult to know what this means. In any event, this particular observation is irrelevant since its policy implication is unrealistic. Since spatial economies of scale exist, the benefits of concentration have to be evaluated along with the costs. More ambitious strategies, such as the redistribution of population into small, regularly dispersed settlements,[66] are idealistic, anachronistic and impractical. They would not reduce the claims on natural resources unless accompanied by radical, and as yet mainly undiscovered, changes in technology, many of which may be implemented without drastic changes in population distribution. Once environmentalists descend to specifics, policy prescriptions are often contradictory. A common example is the simultaneous recommendation to reduce city sizes and to control urban motor-car use (to reduce pollution and congestion, slow down the building of urban motorways and reduce petroleum demand).[67] The limitation of private vehicle use in cities requires switching to an efficient public transport system, which is viable only in large cities. On current evidence, the problem of environmental conservation[68] is more appropriately tackled by (possibly drastic) social, technical and economic policies affecting society as a whole, rather than by modifications in the population settlement pattern.

The uneasy case for a population distribution policy

49. The argument of this paper is not that no scope exists for a national urban policy. Particularly in countries where population is growing rapidly and/or where the national urban hierarchy is imperfectly formed, such as in many developing countries, policy-makers may have considerable leverage on the settlement pattern. Housing policies, social infrastructure investments and physical planning decisions have to be made in any event; and to the extent that people's needs have to be anticipated and their locational behaviour is influenced by the provision of housing and social capital, it would be wrong not to locate urban capital at places and in amounts considered socially desirable. The capacity to mould the settlement pattern is much greater in these cases than in the mature, developed economy with a high degree of urbanization and a low projected rate of population growth. The implication of this argument is that the choice of an appropriate policy, or indeed whether a policy is necessary, cannot be divorced from the specifics of an individual country—its institutional environment, level of development, rate of growth, demographic characteristics, existing urban structure and other factors.

50. One distinction between urban-size strategies and aggregate population policy is that measures for the former concentrate, directly and indirectly, far more upon migration rates than on reducing fertility. If changes in the rate and direction of intranational migration flows are the primary form that city-size adjustment takes, then measures to check certain city sizes or to

[66] For an extreme suggestion of this kind see "A blueprint for survival", *Ecologist*, January 1972.

[67] The encouragement of decentralization may give rise to similar contradictions.

[68] Another aspect of environmental conservation, a subject of much attention in such small densely populated developed countries as the United Kingdom, is the preservation of the countryside and ensuring access to open space. Pursuit of these objectives has implications for settlement policy, but the interactions are too complex to explore here. However, they raise problems for the spatial distribution of population much more than for the size distribution. To the extent that they affect the size distribution, dispersion into small rural settlements, if practical, could have severe adverse effects.

boost others have repercussions elsewhere in the economy. It is important, therefore, to recognize the interdependence of the interurban system and the feedbacks between the urban and rural economies. Despite the crucial importance of migration in differential urban growth, very few countries adopt migration subsidies and controls as instruments. The reasons are obvious, though not necessarily overwhelming. There are so many different types of migration streams that net flows are difficult to monitor and control. Direct migration controls on household movements are hard to sell politically, and evasion would be relatively easy Migration subsidies are more practicable, but the level of subsidy may need to be high to counteract the pull of market forces towards particular cities Furthermore, a side-effect may be to induce a higher over-all migration rate, whereas in many circumstances a reduction in this rate is required Many policy-makers prefer to influence migration indirectly by subsidizing job creation at specific locations, capable of diverting migrants from their "preferred" destinations This strategy assumes that employment opportunities are the main determinants of migration. A middle course occasionally suggested is to subsidize employers in fast-growing (but still suboptimal?) cities according to their capacity to absorb migrants, but lavish aid to prosperous cities is difficult to justify upon equity grounds.

51 Urban-size strategies have had a mixed success, and there have been very few co-ordinated attempts to influence the size distribution as a whole rather than acting on specific size ranges (e g , controlling the largest metropolis, growth centre and new towns policies, agricultural marketing and service centre strategy) Too little is known about the effectiveness of various instruments One may ask whether, if migration subsidies are impractical, investment incentives are more or less effective than infrastructure investment for attracting jobs. For the control of large cities, there is scope for both prohibitive controls (land-use controls, factory licences) and pricing policies (payroll taxes, pollution charges, congestion taxes) In developed countries, intra-urban controls are more powerful, and their effects more predictable, than interurban instruments If this is so, the emphasis shifts away from size to structure, and polynucleated clusters of cities may be more satisfactory from efficiency, equity and social points of view than manipulating the size of "free-standing" cities. Since many national and regional policies (agricultural policy, fiscal measures, industrial strategy) have indirect effects on urban size, their influence should be taken into account On the other hand, for many urban problems, pollution being a good example, technical solutions and pricing strategies are more effective than size-control measures Environmental instruments may also be relevant to the promotion of smaller cities if amenities are considered an important locational attractor. [69]

[69] L H Klaassen, *Social Amenities in Area Economic Growth* (Paris, Organisation for Economic Co-operation and Development, 1968)

52 Apart from the bluntness and limited effectiveness of urban policy instruments, a more critical question is that of the scope for a national urban size (or, more generally, national settlement pattern) policy. The solutions to many so-called "urban" problems (crime, stress, poverty, race, drugs, even pollution and congestion) are not to be found by altering the national settlement pattern These are problems "in" cities rather than "of" cities, [70] and national urban strategies cannot solve general economic and social problems As suggested above, many goals may be relevant to a national population distribution policy, [71] but changing the distribution of city sizes is too clumsy and too broad a strategy for dealing with a set of multiple, and occasionally conflicting, goals Certainly, there is no evidence to suggest that a more even size-distribution of cities implies either greater efficiency or higher welfare than a skewed distribution The neat theoretical prescription of equating marginal social benefits and costs is non-operational because most of the social costs and benefits cannot be measured, and, hence, the appropriate taxes and subsidies cannot be determined, even if a marginal cost pricing strategy were politically acceptable

53. One component of national urban policy that has received widespread application is a growth-centre strategy The aim here is to boost the size of urban centres, particularly in lagging regions, to the level where growth becomes self-sustaining However, growth-centre policies manifest themselves in different ways The size of growth centres may vary widely according to whether the objective is to develop rural service centres, to articulate a polarized spatial strategy for regional development, or to promote counter-magnets to a major metropolis. [72] At one extreme, e g , Sweden and Northern Canada, the lower size-limit may be 15,000-30,000, in many other countries, 250,000 is considered a minimum critical size

54 The growth-centre approach can be treated only as one aspect of a population distribution policy Its validity is based primarily upon its usefulness as a regional rather than a national spatial strategy Growth-centre policies have had little impact upon the size-distribution of cities This situation reflects in part the limited period in which policies have operated, and it is due in part to the fact that the more successful experience has been where resources have been concentrated on a very few centres, which show up as no

[70] W Alonso, *Problems, Purposes and Implicit Policies for* [illegible]

[illegible] size, systems of cities and urban policy: a sceptic's view", *loc cit*

[72] See N M Hansen ed , *Growth Centers in R*[illegible] *co-nomic Development* (New York, [illegible] Press [illegible] Kuklinski ed , *Growth Poles and* [illegible] *Planning* (The Hague, Mouton [illegible]),

more than a minor kink on the rank-size curve. Lastly, the theoretical framework for growth-pole analysis (e.g., the links between propulsive industries, the dynamics of technical change and spatial externalities) has been devised and most of the practical applications have occurred in mixed developed economies. There is very little evidence that this type of strategy is suited for developing countries.

CONCLUSION

55. The foregoing discussion suggests that an optimal spatial distribution of population is elusive. The hierarchical structure of cities, and the metropolises at the apex of the hierarchy, are important for efficiency, welfare and for the attainment of regional and national objectives. There is little evidence that large cities, in any objective sense, too large. If higher costs are outweighed by higher productivity, the problem is one of income distribution, not a diseconomy of scale. On the other hand, even if it is difficult to argue that a particular level of urban population is too high, there may be some circumstances in which city growth rates are too rapid,[73] especially from the point of view of maintaining environmental quality standards. However, this is not a problem of city size *per se*, but of the absorption rate.

56. There is a strong case for pragmatism and for the pursuit of attainable goals using feasible instruments. Clearly, a city-size equalization strategy would be wrong. There is scope for measures to influence the national urban hierarchy, for instance, by promoting growth centres and perhaps by stimulating decentralization from the largest cities. On the other hand, it would be futile to try to redistribute population directly from the large cities to smaller distant urban centres in other regions. This strategy would dissipate resources that could be more sensibly deployed elsewhere. In particular, the dangers of grandiose national population distribution strategies are that they divert attention from the crucial tasks of remedying the most obvious resource misallocations within the city and of improving the quality of life where risks of deterioration are greatest. Urbanization is not undesirable, but it may improve welfare rather less than it boosts growth. Hence, the solution is not to check urbanization *per se*, but to correct for its side-effects.

and R. Petrella, eds, *Growth Poles and Regional Policies* (The Hague, Mouton and Co., 1972).

[73] Rising marginal costs may reflect inelastic short-run supply functions rather than "real" higher social costs.

SELF-HELP CITY: THE INTERNAL ORGANIZATION OF METROPOLITAN AREAS *

Charles M. Correa **

THE PROBLEM AND THE OPPORTUNITY

1. Thoughout the developing world, urban centres are growing As recently as 1941, Bombay had a population of 1 5 million, today it has almost 6 million, within a decade it is expected to exceed 10 million [1]

2 Furthermore, Bombay is not an isolated phenomenon [2] Estimates vary; but in general over the next 25 years, the urban population of India is expected to grow from 100 million to at least 300 million This is owing in part to the growth of the urban sector (from the current 18 per cent to an expected 30 per cent [3] of the population), and in part to an absolute growth of the population (from a current level of 560 million to just over 1,000 million in the year 2000)

3. There can be no doubt that, under this kind of pressure, cities will crack. [4] Calcutta is already the first casualty After all, in many of these cities, there already exist considerable shortfalls in the service and social infrastructure, not to mention housing By Government count, approximately 12 million new housing units must be built in the urban areas in order to meet existing needs [5]

4 *It is evident that growth on this scale necessitates* several different strategies which must be implemented simultaneously:

(*a*) The first is to create growth centres at the village and small-town level, [6]

(*b*) The second is to encourage the growth of new towns and cities in the less developed parts of the country, which will act as countermagnets to the large metropolitan centres of Bombay, Calcutta, Delhi and Madras, [7]

(*c*) Because both strategies (*a*) and (*b*) would have a take-off period of at least 10-15 years, there must simultaneously be strategies that allow the existing metropolitan centres to function during this take-off period

5 If the first two strategies fail, there is a real possibility that a city like Bombay may reach a population of from 50 million to 60 million by the turn of the century (as some demographers have predicted). [8] But even if these strategies are successful, there still remains the problem of making Bombay function with as many as 10 million or 12 million people in it, and all this in the space of little more than a decade

6 A number of cities throughout the world are growing at this rate. For instance, since 1950, the population of Abidjan (Ivory Coast) has grown from 69,000 to well over 500,000, Lagos (Nigeria), from under 250,000 to 1,500,000, Bangkok (Thailand), from less than 1 million to 3 million; and Bogota (Colombia), from 650,000 to over 2,500,000 In some of these cities, it may be possible to achieve this growth within the existing land-use and infrastructure pattern However, it is the main purport of this paper that in the majority of cases, there might be considerable advantages—both in economic costs and social benefit—to develop new land-use patterns on a large scale, either within, or continuous to, the existing city.

7 Furthermore, if one can succeed in rationally coordinating responses to this urban-growth phenomenon,

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** City planner of "New Bombay", Bombay, India

[1] *Report of the Bombay Metropolitan Regional Planning Board*, 1969

[2] The urban/rural population of developing countries, 9 per cent (in 1940) and 15 per cent (in 1960), is estimated to reach 31 per cent (in 2000); see *Growth of the World's Urban and Rural Population 1920-2000*, Population Study No 44 (United Nations publication, Sales No E 69 XIII 3)

[3] In three major states—Gujerat, Bengal and Maharashtra, the urban sector is either near or over this figure See *Report on Population Projectio s* (New Delhi, Government of India, Press, 1968)

[4] In India, the larger urban centres have a higher population growth than the smaller ones See Rafiq Zakaria, *Augmentation of Financial Resources of Urban Local Bodies* (Delhi, Government of India Press)

[5] India, Ministry of Housing, *Report on Housing* (Delhi, Government of India Press, 1965)

[6] What John Lewis calls "town-centred" growth See John Lewis, *Quiet Crisis in India* (Washington, D C , The Brookings Institution, 1962)

[7] "This dilemma between rural and urban priorities has led to increasing attention to the possibility of accelerating development of small- and medium-size towns or creating new urban growth centres At least *prima facie*, such an approach appears to combire many advantages It would relieve population pressures both in the major cities and the countryside,

imbalances and capture to a greater extent the potential in- [illegible] Bank for

then it might actually be possible to use this enormous quantum jump to permanent advantage, and to emerge from the tunnel, so to speak, better off than before it was entered. After all, most cities in the past have grown by continuous incremental stages. Thus, the authorities never perceived the opportunity to "re-arrange the scenery", as Buckminster Fuller puts it: for instance, turn the clock back to the time when New York City had only 1 million or 2 million inhabitants. If, at that stage, it had been apparent that the city would soon have to accommodate 10 million people, many basic structural changes might have been not only financially possible, but politically viable; and New York today would be a far more rationally organized city.

8. This approach has a further advantage: it is, perhaps, the only way one can urbanize within the almost implacable financial constraints prevailing in developing countries. For example, in the urban areas of India, the income per family is extremely low: 25 per cent earn less than Rs 200 per month; and the next 50 per cent between Rs 200 and Rs 500.[9] Even if one assumes a rent-paying capacity at 25 per cent of this income (high by Indian standards for this income level), then, using brick and concrete, very little can be constructed for this money—somewhere between 1.5 m^2 and 5 m^2 per family—and this for 75 per cent of the population. Of course, simple mud and bamboo houses built in self-help schemes are very much cheaper; but the cost of land anywhere near the city centre becomes exorbitant. Thus, these "sites-and-services" schemes tend to be located on the periphery of cities, not a very happy location as the inhabitants are far away from the main mass transport lines and have no job mobility. In fact, these schemes tend to become ghettos of unemployment at the mercy of one or two local employers. Putting in a mass transport system can be expensive, as is often the augmentation of the other existing municipal services.

9. On the other hand, there are the advocates of high-rise, high-density housing schemes, such as are found in Hong Kong and in Singapore. Here, the cost of service infrastructure is much lower and mass transport is cheaper. However, the cost of the housing unit itself is beyond the reach of the families in question and must be subsidized, but subsidy might have other priorities, such as health, education etc.

10. Thus, one sees that as long as the problem is being dealt with in small bits and pieces within an existing urban context, there doesn't appear to be any solution in sight. One must, of necessity, examine the entire system called "city" and try to arrive at a solution which is the most economical in its total cost per family, including roads, services, schools, mass transportation systems, green areas and, of course, the housing unit itself.

[9] Only 8 per cent of households earn more than Rs 1,000 per month. See P. Ramchandaran, *Housing Situation in Greater Bombay* (1972).

11. This strategy is, in fact, currently being implemented in "New Bombay", a growth centre for 2 million people across the harbour from the old city. It is an attempt to shift the office jobs (which, in Bombay, are growing three times as rapidly as industrial jobs) away from the old city, so that, in one stroke, the pressure on the existing city centre is relieved and a key input is added to the urban equation across the harbour. The state government has acquired 22,000 hectares of land (some scrub, some farming) and has set up a development corporation [10] to design and develop the new city. The enhanced value of the developed land will be used to finance the service and social infrastructure, mass transport and housing for the poor. This pattern of cash flow requires only minimal seed capital (in this case Rs 120 million). In such a venture and with such an opportunity, it may be asked how one goes about "arranging the scenery".

Arranging the Scenery

12. To answer the question concerning arranging the scenery, one must ask what the urban Indian expects from his city.

13. In an Indian city today, the first thing that strikes the visitor is the pervasive poverty. This urban poverty is perhaps the worst pollution of all. Long before one sees the smoke in the sky or smells the sulphur in the air, one sees the people living and dying on the pavements. One may ask whether it is inevitable that poverty should degrade life in this manner. The same poverty, in rural India, has a far different expression. The people are as poor, in fact, perhaps even poorer, but they are not dehumanized. In the village environment, there is always space to meet and talk, to cook, to wash clothes. There is always a place for the children to play. One need not take a look at how these same activities occur in Indian cities. Pollution is primarily caused by the misuse of the environment. Obviously, there is no relation between the way cities have been built and the way people use them.

14. Living in an Asian city involves much more than the use of a small room of, say, 10 or 20 m^2. Life in a city necessitates a whole spectrum of activities; it calls for spaces ranging all the way from a place to wash clothes to large community areas for games, public meetings etc. Unless one provides this entire hierarchy of spaces, one has not provided for people.[11] Building

[10] The City and Industrial Development Corporation (CIDCO), a quasi governmental agency with statutory powers.

[11] In the Indian context, this might mean:

(*a*) A small terrace or courtyard, open to sky, usable as a private outdoor room. This space is crucial. It is a multipurpose space usable for many activities, e.g., grinding the *masala*, hanging out clothes to dry, a space where the child can play under supervision—in other words, a multipurpose spill-over space;

(*b*) The doorstep and the pedestrian path. This is where one may gossip with one's neighbour, one's child can play marbles etc.;

(*c*) Larger group spaces. For instance, in Indian villages, the village well. It is really a space for talking and loitering;

(Continued on next page)

housing involves much more than building houses. The little tenement at the end of the line is only one in a complex system of a family's spatial requirements; and this is, perhaps, even truer of the developed countries where, owing to higher family incomes, these requirements become more space-intensive and sophisticated [12] What is being observed today is the desperate efforts of people—especially the poor—to try and work out in some way a pattern of living within the totally inadequate context provided for them But then the question arises whether funds are adequate and whether there is enough space in Indian cities to provide an adequate pattern of living

15 In looking at land-use allocations in cities around the world, one observes, in most cases, that only from 30 per cent to 40 per cent of the area of a city is devoted to residential use. (The remainder is used for commerce, industry, transport, recreation etc) Furthermore, if one examines these residential areas, one finds that only about half the land therein is devoted to the building plots themselves For instance, for a city of 2 million, calculations show that while the area required for the over-all city is approximately 11,900 hectares, the area required for the building sites in the residential sectors [13] constitutes 1,600 hectares, i e, about 14 per cent of the total land use

16 Now, if one doubles the number of dwelling units per residential plot, one would reduce the space required for building sites from 1,600 hectares to 800 hectares, plus another 25 per cent reduction (200 hectares) for local distributory roads One would not be saving more than 1,000 hectares—that is, about 8 per cent of the total area required by the city If, on the other hand, one halves the available area on each residential plot, then the total area required by the city would increase by 2,000 hectares (by approximately 16 per cent) But one may ask—and this is the heart of the matter—whether these variations in the residential densities [14] make a crucial difference in the living patterns—really the life-styles—of the people in Indian cities And, furthermore, it may be asked whether they also make a decisive difference in the cost of the dwelling units themselves

Housing costs and land-use allocations

17 Obviously what one must do is attempt to identify those housing patterns and densities wherein costs and benefits are in optimal balance To begin, three typical housing patterns are examined (*a*) ground-floor terrace houses on small individual plots, (*b*) four-storey walk-ups; and (*c*) ten-storey high-rise buildings The figure given below shows a residential sector, 780 by 740 metres Everyone lives within from six to eight minutes walking distance of the mass-transit stop. The social infrastructure (at 30 m^2 per family, for kindergarten schools, children's playgrounds, local shopping, health centres etc.) is along the pedestrian green spine which runs down the middle of the sector. The land-extensive uses (such as playing fields) have been kept just outside the sector, farthest away from the mass transit so as to minimize service infrastructure costs.

18 Assuming an average carpet area of 32 m^2 per family, gross residential densities are achieved approximately as follows 500 persons per hectare using ground-floor houses (on individual plots of 4 × 11 metres each), 750 persons per hectare using four-storey walk-ups; and 1,000 persons per hectare using buildings of 10 storeys (Density is not a direct function of the height of the buildings This is due in part to the fact that the taller the buildings, the further apart they must be, and in part to the social infrastructure area *per capita* being constant)

19. The cost of the five-storey walk-up tenements is approximately Rs 14,200, the cost of service infrastructure (roads etc) is Rs 1,600, i e, about 12 per cent of the total cost Increasing the density to 10 storey high-rise buildings will reduce the service infrastructure cost to Rs 1,100 per tenement, however, this saving is more than offset by the additional cost of elevators, fire-fighting provisions etc (not to mention the maintenance cost and replacement cost of such sophisticated equipment, usually obtainable only at a premium in developing countries). On the other hand, reducing the density to ground-floor houses, though it increases the cost of service infrastructure to Rs 2,250 per unit, is actually no more expensive, since this extra cost is compensated by the fact that individual ground-floor houses do not require the circulation corridors etc. of walk-up tenements (circulation corridors consume about 12 per cent of the total built-up area). Furthermore, since a ground-floor house can be built in stages, one can begin with a single room, a water-closet and a water-tap in the courtyard The roofless courtyard is really additional living-space of crucial value to the family, a benefit that must enter into one's calculations as a negative cost, thus reducing the over-all price tag still further.

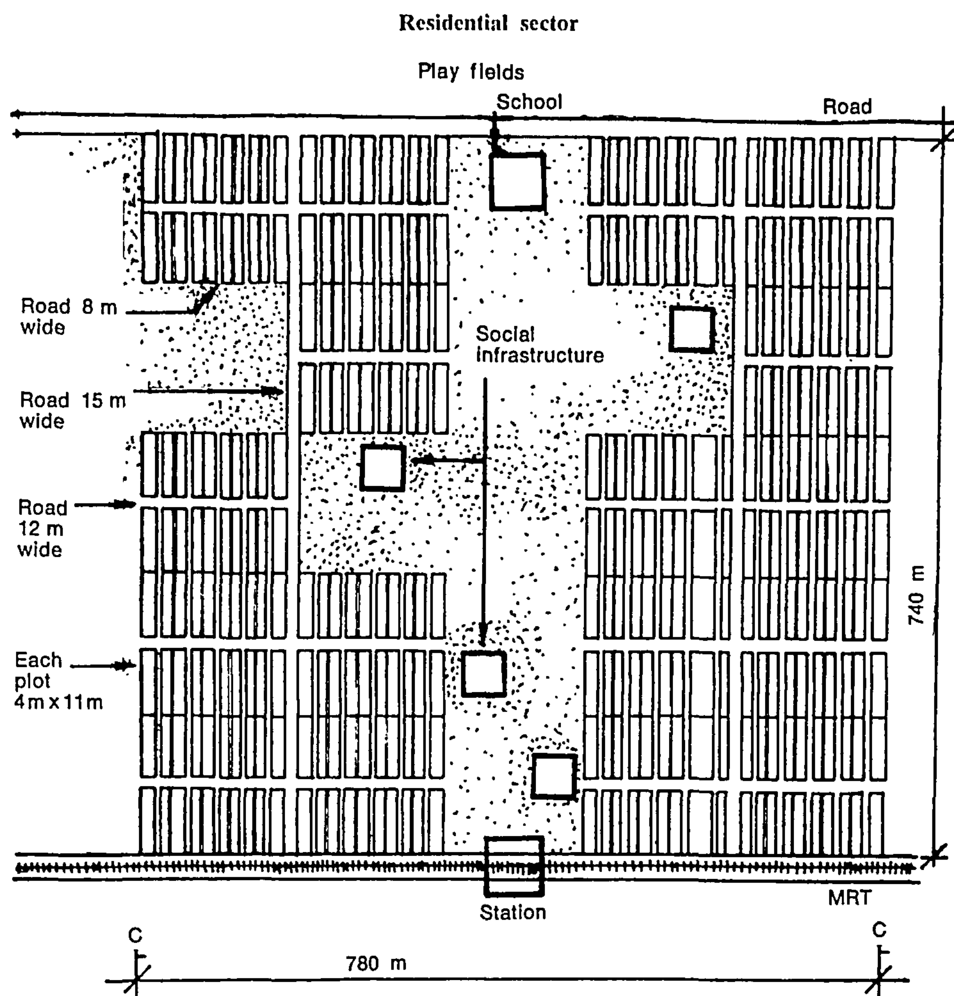
20 Most important of all, the construction need not be of cement and steel, but of any available materials, beginning with bamboo and mud, which will, of course, reduce the construction cost of the units drastically ' , in most developing countries, there ist

(*d*) The main community space This is the large area, the *maidan* it is the space to kick a football, to fly a kite or to hear a political speech It is common to the whole community

[12] Peter Rich *Notes on low-rise, high-density housing* (London, 1966)

[13] The gross residential densities (including building sites, distributory roads, schools, children's playgrounds, community facilities etc) come to approximately 650 persons per hectare a reasonably high density, easily achievable in a developing country, since the number of members per household (five) is larger and the carpet-area per household (20 m^2) is considerably smaller than the levels prevailing in developed countries

[14] Studies undertaken for Hook a new town in the United Kingdom show that, assuming a circular town, reducing residential densities from 250 persons per hectare to 100 persons per hectare would increase the area of the circle by 42 per cent but the radius (i e, distance from periphery to city centre) by only 19 per cent See Greater London Council *Planning a New Town* (London 1965)



indigenous systems of building, far more inexpensive—and more relevant—than the so-called "solutions" (prefabricated reinforced concrete panels etc.) currently promoted by many Indian architects and engineers.

21. Indeed, the advantages are considerable. And there are a number of additional benefits which accrue to this pattern of low-rise, high-density housing, whether one is speaking of self-help squatter housing at Lima, Peru, or elegant town houses in Greenwich Village in New York. These benefits include:

(*a*) A low-rise building has a much shorter construction period, so that the interest cost of capital tied up during construction is considerably less;

(*b*) The low-rise building is incremental, i.e., it can grow with the owner's requirements and his earning capacity. Eventually, the owner may want to add an additional floor or two, either for rental or for his grown-up children's families (this would have the additional advantage of increasing the housing densities, though it would entail a certain flexibility in the pattern of infrastructure provided);

(*c*) It has great variety, since the individual owner can design and build it according to his own needs;

(*d*) An individual building his own house is a highly motivated person; this motivation might possibly engender an increase in savings *per capita* so that housing is built without sacrificing other national investment targets;

(*e*) It need not use high-priority construction materials. Multi-storey buildings must of necessity use steel and cement, commodities which are in extremely short supply in developing countries. On the other hand, the individual row-house can be constructed with non-priority materials (the recent advances in paper technology open up a world of new possibilities);

(*f*) Of course, if the house in its early stages is constructed of brick, mud and country tile, then it will not have a life span of more than 10 or 15 years—as compared with a reinforced concrete structure, which will have a much longer life span. But the impermanence of materials used in the early stages of construction is really an advantage, for after 15 years, when the economy improves, one might presumably have more resources to deal with this problem of housing. As Charles Abrams has pointed out, "renewability" should be one of the prime objectives of mass housing in developing countries, for, as the national economy develops, the housing patterns can change;

(*g*) Low-rise housing has considerable social and psychological advantages which have often been enu-

merated,[15] which is, of course, a crucial area of the problem.

22 It must be emphasized that this pattern of low-rise, high-density housing being examined here necessitates only a marginal increase in over-all city size. Unfortunately, most people associate low-rise housing with the kind of suburban sprawl one sees outside Indian cities, which, of course, is not what is being discussed In its concentrated form, low-cost housing is the optimal and classic pattern of residential land-use, an age-old pattern which has been manifested in cities throughout the centuries This is probably the main reason why, up to the Second World War, Bombay could attract a great number of immigrants without having to throw them destitute upon the pavements of the city It is only in recent years that the municipal planning policies have swung away from low-rise buildings in favour of more sophisticated (and expensive) solutions, the additional cost of which is met, of course, by raising the selling price of the units. And in the current distorted land-use picture of the cities in India, it is very easy for the developer to command these prices

23 It is, however, exactly this kind of exploitation which can be avoided by intelligent land-use planning Too much time has been spent in a fruitless search for architectural and structural answers to the problem of low-cost housing, and they exist only to evaporate into thin air Yet, if one looks around the developing world, one finds that there exists in each of these countries—in fact, there has always existed in each of these countries—houses at a price the people can afford In other words, these countries do not really have a problem of low-cost housing, what exists is a problem of land-use planning To determine rationally land-use priorities and allocations is the essence of the task one faces. And pointers to the solution exist—in the villages, at Benares, in Tokyo and in London (a city which is a prime example of many of the principles outlined in this paper and one which is still the most human and livable of all the great metropolitan centres of the West) No, the current lack of low-cost housing is not just the failure of the architectural answers; but, rather, and primarily, it is due to the fact that the planners have stated the question wrongly in the beginning Their suicidal land policies have resembled a poker game in which the stakes are being continuously raised, today, they are surprised to find that they have reached the point when the vast majority of players drop out because they cannot afford the ante.

24 Considering that most of one's life is spent in cities, it is disquieting to realize how seldom one stops to ponder how varied the planning options might really be. Lionel March[16] calculates that just 250 of Ebenezer Howard's Garden City clusters would accommodate all of Britain's urban population in the year 2000, in one third the urban area. The minimum residential plot would be 6 metres wide by 30 metres deep March continues.

"Imagine the countryside developed by a grid five miles square. Now suppose the linear density along the route is 5000 persons per square mile (1.6 Km)—a high density but easily accommodated in houses and gardens Then at one-mile (1.6 Km) intervals there would be functions to support 5000 persons and these could be reached by walking through the countryside or along the service routes. Within 10 minutes by bus or five minutes by car there would be facilities to serve 100,000 persons. In a quarter of an hour by car and 30 minutes by bus a regional centre for 500,000 persons In such a network city all uses would be placed where they were best sited along the route Uses would not be segregated. Public transport would serve evenly an even distribution of activities and population All could live in the town at their front door and in the country at their back All could have a house No one would have to live in a block of flats because of the present inability of land use planning to provide the right shape of plot for the right type of building "[17]

25 To optimize the total *per capita* cost of the system must of necessity involve also re-establishing land-use priorities in other areas of the city For instance, the question may be asked at what point the acreage of green areas crosses the point of diminishing returns; or whether one would be better off providing the same quantum in other ways The city of Delhi, for example, provides 1.5 hectares of green area per 1,000 inhabitants This area is probably lower than that provided in most European capitals, and yet when one examines this figure, one finds that it works out to 15 m^2 *per capita*, i e , 75 m^2 per family It is indeed ironic that families in Delhi, festering in little hovels, should have 75 m^2 awaiting them along some monumental park, and, at the same time, one hesitates to give them a courtyard of 10 m^2 which they will really use

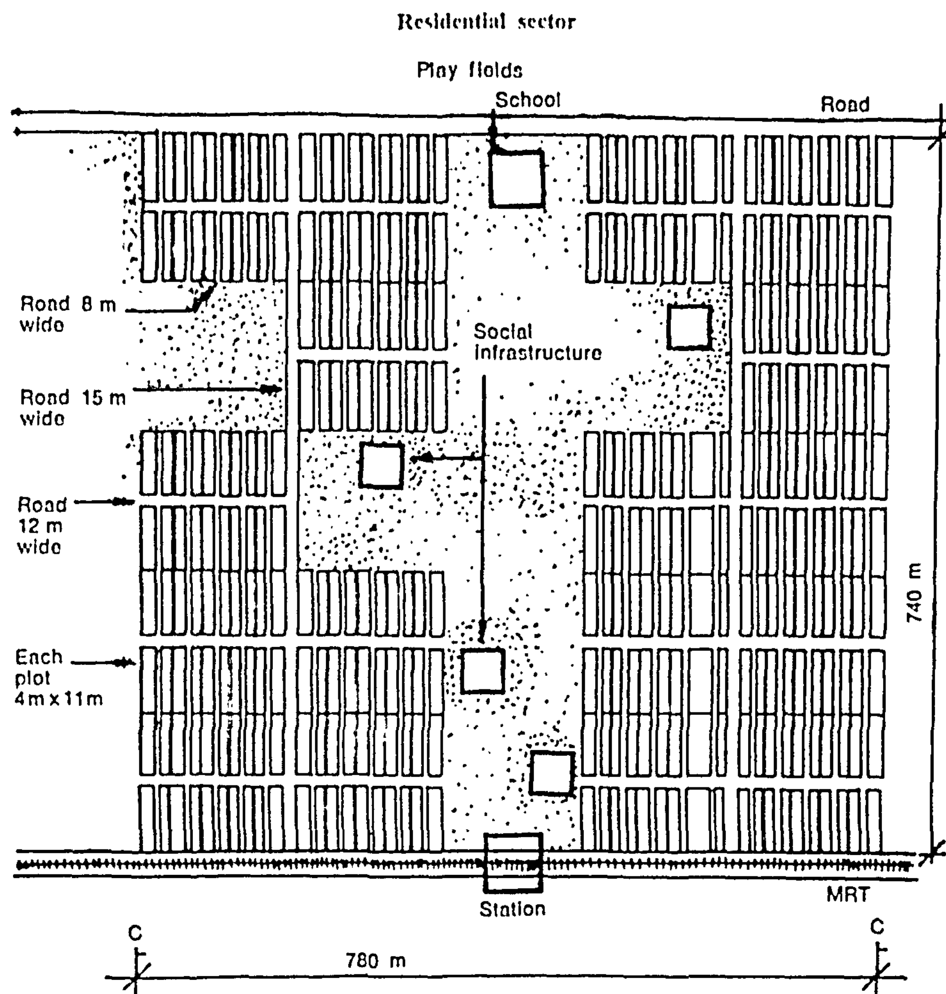
26. As another example, in central Bombay, there are less than 0 10 hectares of green area per 1,000 population,[18] and this figure includes the green in traffic islands Yet merely increasing the *maidans* (open spaces) is not necessarily the solution, for they are not used by the entire population, but only by certain age groups for cricket, football and other such games No little toddler of 2 or 3 years would dare play here; nor does one see middle-aged couples using them for evening strolls On the other hand, the pavement of the Marine Drive—which incidentally does not show up on the statistics—is one of the great community spaces of the city. It would appear that people love a promenade

[15] Jane Jacobs, *The Death and Life of Great American Cities* (New York, Random House, 1961)

[16] Lionel March, "Homes beyond the fringe", *Architectural Design* (London), vol XXXVII (September 1967), pp. 434-436

[17] *Ibid*, p 436

[18] The high densities in most Asian cities are ob- because of high rise buildings, but the criminal sion of the green areas, social etc



indigenous systems of building, far more inexpensive—and more relevant—than the so-called "solutions" (prefabricated reinforced concrete panels etc.) currently promoted by many Indian architects and engineers.

21. Indeed, the advantages are considerable. And there are a number of additional benefits which accrue to this pattern of low-rise, high-density housing, whether one is speaking of self-help squatter housing at Lima, Peru, or elegant town houses in Greenwich Village in New York. These benefits include:

(*a*) A low-rise building has a much shorter construction period, so that the interest cost of capital tied up during construction is considerably less;

(*b*) The low-rise building is incremental, i.e., it can grow with the owner's requirements and his earning capacity. Eventually, the owner may want to add an additional floor or two, either for rental or for his grown-up children's families (this would have the additional advantage of increasing the housing densities, though it would entail a certain flexibility in the pattern of infrastructure provided);

(*c*) It has great variety, since the individual owner can design and build it according to his own needs;

(*d*) An individual building his own house is a highly motivated person; this motivation might possibly engender an increase in savings *per capita* so that housing is built without sacrificing other national investment targets;

(*e*) It need not use high-priority construction materials. Multi-storey buildings must of necessity use steel and cement, commodities which are in extremely short supply in developing countries. On the other hand, the individual row-house can be constructed with non-priority materials (the recent advances in paper technology open up a world of new possibilities);

(*f*) Of course, if the house in its early stages is constructed of brick, mud and country tile, then it will not have a life span of more than 10 or 15 years—as compared with a reinforced concrete structure, which will have a much longer life span. But the impermanence of materials used in the early stages of construction is really an advantage, for after 15 years, when the economy improves, one might presumably have more resources to deal with this problem of housing. As Charles Abrams has pointed out, "renewability" should be one of the prime objectives of mass housing in developing countries, for, as the national economy develops, the housing patterns can change;

(*g*) Low-rise housing has considerable social and psychological advantages which have often been enu-

conceived fixed patterns. When one establishes a city, one is beginning a process. What is needed is a flexible structural plan which indicates probable nodal points. These nodal points, of course, will be primarily determined by the interchanges on the mass transit systems. Human settlements have always tended to locate at transport junctions, on a scale directly proportional to the importance of the junction. Thus, a natural hierarchy of nodal points develops, culminating in the city centre.

34. At these nodal points, higher densities can be allowed to develop for such specialized functions as offices, shopping and luxury apartments The greater the densities, the more the need to separate vehicular and pedestrian traffic [27] In recent years, there have been several proposals to exclude all vehicular traffic from the city centre, movement within the central business district being either on foot or by various forms of horizontal "travelators", moving chairs [28] etc.

35. The structural planning options open to the city will, of course, depend upon the regional transport pattern, topography of the site, breeze directions, existing pollution problems etc. Intermixing of work and residential areas is, in general, advantageous, as it not only makes for shorter journeys to work, but loads the transport system more evenly (In fact, bending the transport pattern around a full circle, with work spaces evenly distributed, can very well double its capacity) However, two important constraints may be involved one is the pollution which may be generated by the industrial units; and the second is the interindustrial linkages which may work against such a dispersal.

36. With respect to pollution, one finds that whereas, in the developed world, urban pollution is principally the outcome of a high level of living (motor-car

pollution is caused by small wood cooking-fires burning all over the city, uncollected garbage [29] and human excreta [30] These pollutants can generate health problems of epidemic proportions. In fact, if the density in the residential areas can be reduced to, say, 80-100 persons per hectare, it may become feasible to dispense with a central sewerage system [31] and to recycle the waste matter to considerable advantage (vegetable gardens etc.) Under Indian conditions, this plan would have the additional advantage of allowing the people a pattern of life to which they are accustomed, as though Mahatma Gandhi's vision of a rural India had an almost exact urban analogue.

[27] B Rudofsky, *Streets for People* (New York, Doubleday, 1969)

[28] Brian Richards, *New Movement in Cities* (New York, Reinhold, 1966)

[29] "Short term air quality surveys in 4 major cities of India", *Environmental Health*, vol 12 (1970)

[30] I Karve and J S Ranadive, *The Social Dynamics of a Growing Town and its Surrounding Area* (Poona, Deccan College Post-graduate Research Institute, 1965)

[31] D Baste, *Planning for Ratnagiri* (1972)

Motivating people

37. The fact is that new towns work best when the are based on the natural life-style of the people. It easy enough to adopt policies that help assimilate loc people [32] displaced by the project (as in the case the Santhal tribes at Jamshedpur). It is much mo difficult to achieve this on a scale of an entire ci population Yet, this and other sociological aspects the problem are of crucial significance. Too ofte planners have unwittingly trapped people, as witne Chandigarh, where the social and economic status a person is instantly identifiable by the sector in whic he lives, and the whole town is locked into a geome rical hierearchy which is utterly feudal. [33]

38 Motivating people to participate in the city all-important, and it involves much more than just th economic impulse It could be something as simple the right civic structure which could prove to be decisive input in the "genetic code" [34]—the "DNA"- of a new city. If one goes back to the beginnings Bombay over a century ago one finds that it neve really had a formal master plan (it was established b a small group of people—perhaps two East Ind Company civilians and an army colonel—who mad a few bold decisions and began a process of growth But what the city did have, up to the beginning of th century, was the right kind of civic structure In shor it had the right kind of mayor, who chose the right kin of city engineer who, in turn, put in the roads and th sewerage lines—usually in the right places. And this far more important than having the right kind of maste plan, but the wrong kind of mayor, city engineer an so forth all the way down the line. Now the civi structure that helped to create Bombay was ver Victorian It involves the whole paraphernelia an mystique of city fathers; a very paternalistic mystiqu which found a responsive parallel in nineteenth centur Indian society. For, in the various castes and com munities of Indian society, there were a number elders and "leaders" who were eager to play this fatherl role. In modern Bombay, none of these kinds of cit fathers are left; or if there are, no one is very intereste in following them. Thus, Bombay is breaking dow because the civic structure no longer relates to the socia realities of the city This is true of several citie throughout the world Yet, the question may be aske how a civic structure relevant to the twentieth centur is to be found. For this structure, indeed, will constitut a decisive element in the DNA of a new city (Fo instance, while Bombay always had only one municipal ty, Calcutta had 28, and the resulting chaos has don

more to ensure the disintegration of Calcutta than all the current efforts of the Naxalites and others.)

The "genetic code" of a new city

39. Though it is beyond the scope of this paper to discuss settlement patterns and optimal urban sizes, from the Indian experience,[35] it has become apparent that little towns in the middle of nowhere (with their high development cost *per capita*) are really a tremendous financial burden upon the industry or function they serve.[36] There really may be a stunningly simple reason why developed countries have large urban concentrations; it is probably the most efficient way to generate wealth.

40. Yet, the problem of generating a large viable centre within a developing economy is indeed a formidable one, especially since the job-generating inputs[37] (really the crux of the problem) are in short supply. In time, perhaps, techniques will be found for re-using some of these inputs. After all, certain inputs are more mobile than others and are, in that sense, re-usable. For instance, dock facilities, once set up, cannot be moved. On the other hand, a key function like that of the Government is highly mobile. Furthermore, government jobs have a high multiplier effect (estimated at five, in the context of New Bombay). Obviously, if new urban growth centres are to be generated, within the limitations of the economy and resources, then one must find techniques for re-using some of the key inputs several times over. As soon as a healthy and sustained growth is ensured, some of these ingredients could be remarshalled and used again. This would be rather like a technique for grafting trees. (Or, perhaps, a better analogy would be a travelling circus: the Government of a developing country pitches tent every 10 years and generates the process of urban growth; then it moves on.)

41. The important thing to remember is that this kind of growth has occurred in history. The British really created Bombay and Calcutta out of thin air. The Spanish manufactured Lima so that they could ship the gold back to Spain. It is interesting that these colonial Powers were really very decisive people. They knew that they would have to act quickly and forcefully in order to keep their empire going. It appears to be more difficult to get national Governments thinking in these terms. Yet, it is crucial that the techniques of urbanization should be invented. For within this decade, the countries of the third world must begin to plan their urbanization patterns as boldly as they plan industrialization today.

42. It is essential that these new urban patterns emphasize mass housing and mass transportation, so that one can completely bypass the whole cycle of motorization and de-motorization that the cities of the West have gone through. With the flow of migrants into the existing centres, the slums and uncontrolled settlements contain an ever-larger portion of the urban population: 33 per cent at Karachi and Calcutta, 41 per cent at Brasilia, as high as 80 per cent at Buenaventura (Colombia). Yet, through rational anticipation, it appears that one might be able to meet this growth by functionally restructuring urban configurations, and, through land-use policies involving large-scale acquisition, developing these areas with a minimal amount of seed capital. The concept of self-help housing already exists; there must now come into being the concept of, and the programme for, self-help city.

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[35] In India, more than 50 new towns have been built since 1947. These were usually single-purpose towns (steel towns, state capitals etc.) varying in size from 5,000 to over 100,000 population.

[36] These costs are usually added on to the sale price of the product; and even if (as in the case of the steel towns) they are subsidized by the Government, the citizen continues to foot the bill, if not as consumer, then as taxpayer.

[37] It is interesting to speculate on the relationship between the physical pattern of a city and its economic growth. Obviously, a land-use pattern that involves high-rise investments will exclude much of small-investment capital floating around in the "bazaar area" of the economy. Furthermore, to the extent that the "bazaar economy" is characterized by underemployment (as opposed to full-time unemployment in the "firm-type" capitalistic area of the economy), it is the more absorptive part of the city structure. This capacity for absorbing increased labour, sometimes called "involution", is found not only in developing countries, but within the traditional peasant agriculture; and it appears to provide, at least in the short run, a certain amount of stability to the socio-political system.

RURAL DEVELOPMENT, DISPERSAL OF INDUSTRIES AND POPULATION REDISTRIBUTION: POLICIES AND EXPERIENCES *

Ashish Bose **

1. The growing concern about the environment has introduced a new dimension to demographic studies The crisis of human settlement is no less acute than the crisis of population explosion and the need for controlling human settlement is as great as that for controlling population growth rates. Yet, in the massive literature on population, the attention given to human settlement is utterly inadequate. Demographers have usually relied on geographers to study the subject. Of late, however, rapid urbanization, increasing rural-urban migration and the consequent ecological problems have forced demographers to devote more attention to urban growth, internal migration and population redistribution. However, the perception of the problem of settlement is still heavily biased by an almost exclusive concern for metropolitan areas and big cities It is still rare to find demographers studying the settlement pattern from the rural angle in spite of the obvious fact that the majority of countries are predominantly rural and most of them will continue to be so even at the end of this century It cannot be denied that some of the environmental problems are most acute in the large cities, but the obsession with pollution problems in large cities tends to underestimate the urgency of such environmental problems as floods, deforestation, soil erosion and primitive sanitary conditions, and a host of allied problems in rural areas. This gives rise to the tendency in the common people to equate environmental problems with the pollution problems of big cities.

2. The chapter on "Problems of human settlements" in one of the pioneering studies on environment, by Ward and Dubos,[1] begins. "The first need is to take the strain off existing cities", and proceeds to give some figures indicating the deplorable housing condition in Indian cities. But one could argue with equal force that "the first need is to take the strain off rural areas—the strain of poverty, unemployment and economic and social stagnation". One could also give figures for the deplorable state of the productive base of the rural economy in countries like India

3. An over-emphasis on the problem of big cities created by "the human avalanche" of migration, to use the picturesque phrase of Ward and Dubos, underestimates the positive role of migration in relieving rural poverty There is inadequate realization of the role of cities as reception centres for the rural poor in countries like India The tendency to look upon rural-urban migration as a nuisance and urbanization as an evil, and to dream of pure air and the picturesque landscape in the countryside is to shut one's eyes to economic reality This is not to deny the urgency of positive measures to regulate rural-urban migration The popular view that as rural to urban migration is creating serious problems such migration should be curbed, is an over-simplification One should ask serious problems for whom? Certainly not for the rural migrant in spite of all the hostilities of the urban environment In fact, poverty and unemployment in rural areas drive the migrant to the city Can one look upon the cities as the exclusive preserve of only those who are already there and ask for an internal passport system in the name of orderly urban development? As a recent study of poverty in India by Dandekar and Rath points out "Urban poverty is an outflow of rural poverty Hence action against poverty has to be initiated in the rural areas" [2]

4 Regional development has been put forward as the answer to most problems of unbalanced development of human and material resources, excessive metropolitan development, concentration of industries in a few areas, growing environmental degradation and other related issues Yet, in spite of some significant contributions to regional science in recent years, the theoretical studies are still scanty Besides, at the implementation level, regional planning usually becomes a political issue and not a theoretical tool for better national planning

5. In a recent study of regional development in South and South-East Asia, sponsored by the United Nations Research Institute for Social Development, the authors point out

> "In spite of the [illegible] forces, the geographic dispersal of industrial development is, rightly or wrongly, accepted almost everywhere in the Region as a desirable social objective Unfortunately, decisions are based on very little factual and theoretical analysis of urban growth and patterns of locational [illegible]

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* The original text of this paper [illegible] was submitted to the Symposium on Population, Resources and Environment, Stockholm, 26 September-5 October 1973

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[1] Barbara Ward and René Dubos, *Only One Earth The Care and Maintenance of a Small Planet* (New York, W W Norton and Co., 1972), p 111

[2] V M Dandekar and Nilakantha Rath, "Poverty in India", *Economic and Political Weekly* (New Delhi, 1971), pp 25-41 and 106-146

tion. In fact, government agencies frequently attempt to induce the dispersal of industries by providing production facilities and urban infra-structure as well as fiscal incentives to new industries without understanding the forces involved. The much commented 'growth pole' theory, relied on to provide the intellectual framework for dispersal policies in some of the countries, unfortunately does not offer much policy guidance with respect to the *a priori* identification of potential growth centres.

"The problem is difficult, in part because there may be valid reasons for wanting to sacrifice some commercial profitability for the sake of other social objectives. In addition, there may also be diminishing returns to scale effects and genuine social costs which outweigh the benefits of agglomeration. Whatever the case, it is not possible, at least in the current state of the art, to provide universally valid general principles and guidelines for the determination of the optimal degree of concentration or dispersal." [3]

6. The introduction of the environmental variable makes the benefit cost analyses and other exercises more difficult and complex. This highlights the need for a series of theoretical studies on the human settlement pattern in relation to environmental problems which can systematize the different levels of interaction between population, resources and environment.

7. The empirical studies on internal migration and population redistribution are scanty not only in the developing countries, but in the developed countries. Concerning this subject, Hilde Wander comments:

> "Contrary to policies regulating the international flow of migrants which have for many decades attracted the interest of social and economic researchers, policies affecting internal migration have seldom been the subject of systematic investigation . . . . Not only the impact of direct migration policies has largely escaped intensive analysis; it has also never been sufficiently studied how other forms of public policy, especially in health, education, social welfare or economic fields, or how the lack of certain social policies have indirectly influenced propensities and opportunities to migrate. Similarly, the backwash effects of such 'spontaneous' migrations have hardly ever been thoroughly reviewed." [4]

8. Here again, the introduction of the environmental variable will make such empirical studies more meaningful. The current state of knowledge on the relationship between urbanization and environment in different parts of the world is severely limited, however, by the paucity of data and systematic long-term studies.

9. To sum up, in the absence of adequate theoretical and empirical studies on the interrelations between population, resources and environment, much of the thinking is guess-work and speculative, the solutions offered tend to be the obvious and the simplest, and the implementation of whatever policies are put forward is by and large ineffective and incapable of meeting the challenge of the crisis of human settlement. Other obstacles are the lack of an effective administrative machinery to tackle environmental problems; political interference often responsible for ignoring technical solutions, especially in regard to locational policies; and the high cost of preventing environmental degradation.

Rural development as a deterrent to rural-urban migration

10. It is important to realize that the success of urbanization policies in developing countries depends to a considerable extent upon the success of modernization of agriculture and transformation of rural areas. Under conditions of rapid population growth and agricultural stagnation, the flow of migration from rural to urban areas cannot be stemmed merely by restrictive policies. The best deterrent to migration in such a situation is accelerated rural development.

11. Gunnar Myrdal, while analysing the problems of agricultural development in South Asia, calls for "fundamental changes in the traditional agrarian structure and in the attitudes of the people living and working within it". [5]

12. A common feature of the developing countries in Asia is excessive dependence upon agriculture. One of the primary objectives of development planning is to reduce this dependence on agriculture and evolve a more diversified occupational structure. In many of these countries, the persistence of a colonial economic structure and a rigid social system in the face of rapid population growth makes the task of economic development very difficult. This results in structural stagnation. When the economy falls into this trap of stagnation, there is no migration of labour from agriculture to industry and the proportion of the agricultural labour force remains more or less constant.

13. In a paper on population growth and the development of a dual economy, Sato and Niho [6] present a useful theoretical analysis of such stagnation. Their analysis is of particular relevance to such countries as India, which possess a fairly advanced industrial sector, but, at the same time, have a large proportion of workers still in the backward agricultural sector. These authors observe:

> "If the actual growth rate of population tends to exceed the maximum sustainable rate, without governmental measures of population control, the society will fall into a trap of stagnation. If, on the

[3] Louis Lefeber and Mrinal Datta-Chaudhuri, *Regional Development Experiences and Prospects in South and Southeast Asia* (The Hague, Mouton and Co., 1971), p. 15.

[4] Hilde Wander, "Population policies affecting internal migration and urbanization", in International Union for the Scientific Study of Population, *International Population Conference, 1973* (Liège, 1973), vol. 3, pp. 359-361.

[5] Gunnar Myrdal, *Asian Drama: An Inquiry into the Poverty of Nations* (Harmondsworth, Middlesex, England, Penguin Books, 1968), vol. II, p. 1366.

[6] Ryzo Sato and Yoshio Niho, "Population growth and the development of a dual economy", *Oxford Economic Papers*, new series, vol. XXIII, No. 3 (1971), pp. 433-434.

other hand, some means are found to suppress this population explosion, the society can achieve the steady process of development. The society can, *alternatively*, achieve modernization if it can raise maximum sustainable level of population growth rate higher than the present level of population growth by improving technology in agriculture and/or by changing production conditions in agriculture The results we have obtained emphasize the importance of positive population policies as well as the policies promoting technical change in the society " [7]

14. The population problem thus cannot be viewed merely in terms of an accelerating growth rate resulting from a persistently high birth rate and a rapidly declining death rate. The population problem in the developing countries of Asia is much more a problem of structural stagnation on account of a persistently high proportion of the working force depending on traditional agriculture. Considered from this point of view, improvement in agricultural technology and the modernization of agriculture not only will have a bearing on agricultural productivity but will release forces of modernization which will affect the attitude towards family size

15. It is curious that in the massive discussions on the population problem in recent years, so little has been said about the relevance of land reforms to the population problem. In countries where a predominant majority of the population depends upon agriculture and *the major share of the national income is derived from* agriculture, it is but natural that any demographic policy which seeks to influence fertility behaviour must take note of the basic economic reality Unless the social and economic life of the rural masses is touched by policy measures, economic and social stagnation cannot be broken

16 The development of rural areas *per se* will not necessarily lead to reduced rural-urban migration unless rural-urban disparities between wage rates, income levels and employment opportunities decrease over time. It is not always rural poverty which encourages out-migrations from rural areas For example, in the developed countries of Europe, rural-urban migration is motivated by higher incomes and increased availability of non-agricultural jobs. But, as a study by the United Nations Economic Commission for Europe (ECE) [8] points out, a certain threshold in income level has to be reached before agricultural workers leave the land. It has been suggested that the incentive income ratio between *agriculture and industry is 60 per cent or less* in the case of farmers, but as high as 80 per cent in the case of agricultural hired labourers. This study contends that

"The income factor as a determinant for leaving agriculture has, *however*, weakened because of government farm policy to increase farm incomes.... In recent years . government agricultural policy has concentrated on increasing production, investment and incomes in agriculture This policy has led to more favourable relative income levels in agriculture than before. Farmers receive a considerable measure of price or income support through guaranteed prices, import restrictions and direct grants or subsidies " [9]

17 Another factor generating rural-urban migration is mechanization of agriculture There are striking differences in the situation in the developed and developing countries The ECE study observes·

"It is, however, difficult to say to what extent mechanization of farm operations and a transfer of workers from agriculture to industrial and service occupations have been the cause and to what extent the effect of rising agricultural productivity The occupational shift is, therefore, clearly integral to the process of economic development and a necessary adjustment to increased productivity in agriculture itself and in the economy as a whole The movement has been taking place gradually but by now agricultural labour is so small that rural-urban migration has little effect on the employment market where the agricultural worker represents only a minor source of new recruitment for expanding industry and services This again strikingly contrasts with the situation in developing countries where migration *from rural areas is of such a magnitude and character* that it constitutes a disturbing factor for a balanced development of the national economies " [10]

18 Lastly, it is important to bear in mind that throughout the world young people migrate from rural areas to cities, though not necessarily for economic reasons. Unless the image of rural areas is improved, rural development alone will not be an effective deterrent to such migration As Marion Clawson rightly points out·

"The ambitious farm youth frequently seeks to leave farming, for a city occupation, not only because its economic rewards may be greater but also because its social prestige will be greater In all too many countries, agriculture *is a field of economic activity* of second or lower rank, socially speaking Such an attitude greatly impedes agricultural development, and greatly complicates a coordinated development of agriculture and of urban centers. National planners and leaders must adopt measures to increase the social standing and the public regard for agriculture, at both farming and professional levels, if agriculture is to advance as much as is economically possible." [11]

19. While it is possible to argue that rural development is the best deterrent to excessive rural-urban

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[7] *Ibid*

[8] United Nations Economic Commission for Europe, "Rural housing in selected European countries", in *Rural Housing —a Review of World Conditions* (United Nations publication Sales No E 69 IV 8)

[9] *Ibid* p 41

[10] *Ibid*, pp 41-42

[11] Marion Clawson, "Modernization of agriculture and urbanization", paper presented to the Rehovot Conference on Urbanization and Development in Developing Countries, 16-24 August 1971, p 6

migration, the argument cannot be stretched too far. It may be true that people, by and large, will not opt for the big city if they have a choice, and, indeed, they may indicate their preference for rural areas; but a detailed probe often reveals that what people really want is to enjoy the benefits of both city and rural life and it is doubtful if they would really opt for rural areas which are far away from metropolitan centres. For example, a survey of residents in Wisconsin (United States of America) shows their preference for smaller places within commuting distance of a metropolitan central city: 70 per cent of the respondents said they would prefer to live near a metropolitan area, whereas only 54 per cent actually lived in such an area. Commenting on this, the report of the Commission on Population Growth and the American Future observes:

"We do not know if the results of the Wisconsin survey reflect national attitudes. If they do, it means people want the best of both worlds—the serene and clean environment of rural areas and the opportunity and excitement of the metropolis. Perhaps it is not accidental that much metropolitan growth in fact occurs in peripheral areas with a semi-rural environment. Ironically, people moving to such areas typically find that they soon lose their more desirable aspects—semi-rural areas rapidly become suburban." [12]

20. The search for a more satisfactory habitat has led to the advocacy of small towns and growth centres, which, it is argued, could serve as bridges between the big cities and the rural *hinterland*.

Dispersal of industries and development of growth centres

21. The general trend of thought throughout the world is in favour of dispersal of industries, development of new growth centres in medium-sized and small towns, establishment of new towns, market towns and service centres, improvement in rural housing, creation of better employment opportunities in rural areas, improved mass transportation and a host of other measures to counteract the lopsided growth of metropolitan areas and big cities. While the philosophy of such measures cannot be challenged, the economics of these measures remains controversial, especially in the developing countries.

22. The economics of the development of new growth poles and new towns still remains a neglected field. Reference has already been made to a recent study of regional development in South and South-East Asia, which laments the lack of cost benefit studies supporting the policy formulations. A study sponsored by the Asian Development Bank concludes:

"Realistic policies towards industrial location and associated urban growth are among the most difficult for Southeast Asian governments to adopt because they run counter to deeply held political beliefs and against strong vested landownership interests.... It is . . . difficult for provincial politicians to accept that the development of a limited number of industrial centres with populations upwards of a million is far more economic than the spread of industry throughout a country . . . . Appropriate investment in urban development will not only provide a direct stimulus to industrial growth by solving the land bottleneck, bringing labour close to the factory, and increasing the market both for intermediate products and final consumer goods, but will also make a contribution to that growth of small-scale industry and employment which Southeast Asian countries are so eagerly seeking." [13]

23. This view will be challenged by many and certainly by the exponents of the growth-pole theory.

24. A case is often made for the development of small and medium-sized market towns. The argument runs:

"... Once rural incomes rise, both spending and saving will grow. The resulting investment can, in turn, set transformation in motion, and the greater the number of central places where the intensified activity occurs, the greater the vigour, continuity and acceleration of the process of transformation. The critical places are the market towns and small cities." [14]

25. This approach was challenged by an Indian economist, who argued:

"(our) main contention . . . is that while developments in the physical infrastructure of an economy can bring about quantitative and even some qualitative adjustments in the super-structure, they cannot induce basic structural changes . . .

"Now, what are the basic reasons for the extremely unsatisfactory state of affairs of India's rural economy, more so West Bengal's? Is it due to lack of roads, electricity, warehousing or rural industrial estates? In all these spheres, particularly rural electrification, West Bengal is one of the most backward amongst the different States even of India. But can it, therefore, be concluded that if more of such infrastructure facilities are built up, the condition of rural Bengal will change radically?

"The answer to the above question will clearly be in the negative if we bear in mind the existing facts regarding the pattern of land distribution and the deadly grip of the evil trinity, viz. the landlord, the money lender and the speculative trader, over our rural economy.

"Thus 70 per cent of the peasants in West Bengal own less than 18 per cent of the total land while 4

[12] United States of America, *Population and the American Future*, the report of the Commission on Population Growth and the American Future (Washington, D.C., Government Printing Office, 1969), p. 34.

[13] Asian Development Bank, *Southeast Asia's Economy in the 1970s* (London, Longman, 1971), p. 240.

[14] E. A. J. Johnson, "The integration of agrarian, commercial and industrial activities in functional economic areas", in National Council of Applied Economic Research, *Market Towns and Spatial Development* (New Delhi, 1972), p. 73.

per cent of the peasants at the top own 27 per cent of the total land In what way will the condition of the smaller peasants, with holdings of less than 2.5 acres, improve from extension of electricity, warehousing, transport linkages with servicing and market centres and so on? They will hardly be able to take power either for domestic or for irrigation purposes because the cost of electrical implements and installation will be prohibitive for them They will not have sufficient holding capacity to enable them to store produce at warehouses in order to get higher prices. And of what use will be the roads to them? Not owning any implements, and not producing much surplus they will hardly need access to a market town either for purchasing spare parts and servicing of machines and implements or selling products " [15]

26. There is not doubt that in India, in the context of the "green revolution" and the possibility of generating agricultural surpluses, there is need for market towns, but obviously the first step should be to make the "green revolution" a success rather than plan for 14,000 market towns, as suggested by some experts

27 The growth centre concept is often seen as a substitute to radical relocation policies For example, Preston Andrade observes. "The focus .. on a community composed of a growth centre and a group of dependent villages has the advantage of great flexibility It avoids the necessity for such radical relocation policies as have been adopted in parts of Eastern Europe and it provides for changes required by future development." [16] Andrade points out that much depends upon the political system and what is possible in Poland is not possible in India For example, Poland "is simply eliminating all settlements of less than 2,000 population, enlarging some and relocating the people. . . ." [17]

28 The implications of the urban growth-centre concept have been neatly summed up by Lloyd Rodwin as follows:

"The fact that the size and the characteristics of the activities are ambiguous, the costs and benefits uncertain, and the factors which determine the location of successful centers not at all clear does not discourage use of the concept. On the contrary, its ambiguity contributes to its suggestiveness as well as to its misuse And, despite pleas for more rigorous definitions, the situation is unlikely to change much until we know more about the sequences or stages by which growth and urban development spread to lagging regions and more about the type of urban patterns and policies that exert the maximum influence on lagging hinterlands." [18]

29. This brings the discussion to the allied issue of industrial estates. Several countries have programmes for developing industrial estates as instruments of regional dispersal policy Like the growth centre concept, the case for industrial estates is strong on logical grounds, but the actual working of these estates reveals the practical difficulties of this approach. "Analysis of the 'Industrial Estates' programme in India and Singapore brings out sharply the obvious truth that in a market economy success or failure of an enterprise depends primarily on market conditions " [19]

30 Obviously, it is not fair to compare India with Singapore *The study itself points out that the industrial* estates of Singapore are comparable to the successful "trading estates" in the United Kingdom of Great Britain and Northern Ireland, where "the uncertainties of transport and communication were never as great as in the rural areas of India" [20] Another study of industrial estates in India points out "It is no longer a secret that industrial estates located on the outskirts of metropolitan centres have succeeded while others in the countryside have almost invariably failed " [21]

31 For the purposes of this paper, it is not industrial estates as such which are the matter of concern, but their effectiveness from the point of view of the dispersal of industries The conclusion arrived at by Lefeber and Datta-Chaudhury merits attention

"In India, as in some other South East Asian countries, the programme was saddled with the additional responsibility of creating employment on a large scale and particularly by policies attempting to influence the choice of techniques (labour intensity) in the direction of those used in traditional small scale industries. Even though the policy was not effective, it may have restricted in practice the choice of product and sometimes also the choice of markets The structure of the market for products usually associated with small scale industry does not help the new industrial entrepreneur, who wants a regular buyer for all his products. A co-operative marketing or state-trading organization might perhaps provide necessary support But in the present situation entrepreneurs on industrial estates have strong reasons for wanting to be on the fringes of the established industrial sector of the larger economy. As a consequence, the effectiveness of the 'Industrial Estates' programme as an instrument of regional dispersal is rather limited in an under-developed country, although it may play a valuable role in promoting general industrial de-

[15] A N Bose, "Socio economic basis of small town development", in National Council of Applied Economic Research, [illegible]

[illegible] in Lalit [illegible] *Growth* [illegible] y Devel-

[18] Lloyd Rodwin, *Nations and Cities A Comparison of Strategies for Urban Growth* (Boston, Houghton Mifflin Company, 1970), p 25

[19] L. Lefeber and M Datta-Chaudhury, *op cit*, pp 183-184

[20] *Ibid*, p 184

[21] Lalit K Sen, "A new strategy for community development, planning for integrated area development and rural growth centres", in Lalit Sen, ed., *Readings in Micro-level Planning and Rural Growth Centres* (Hyderabad, Na[illegible] Institute of Community Development, 1972) 30

velopment by encouraging new entrepreneurs and helping the acquisition of new skills." [22]

32. A pertinent question that arises is whether accelerated rural development, development of growth centres, market towns, service centres, industrial estates etc. can check the primacy of large cities. In his statistical study of the location of industries and population, Colin Clark [23] gives examples of countries where the primacy of large cities has been maintained or has increased or decreased. He also talks of "oligarchies" in the context of urban growth. Briefly, his conclusion is as follows:

> "Russia ... apparently made efforts to check the primacies of [the] largest cities; but even in planned economies, this does not seem to be an easy task. Russia shows a remarkable lack of industrial cities of middle-ranking size....
>
> "Switzerland, Netherlands and Belgium are countries which have made conscious and successful efforts to check the relative growth of their larger cities....
>
> "One may perhaps apply the term 'oligarchy' to countries, such as Japan, India and Brazil, where the towns over 100,000 population have a bigger share of the total urban population than would be expected from the straight line relationship [between population of city and cumulated number of cities above specified population] but where, at the same time, the primacy of the leading city is kept in check. Still more striking is the oligarchy of five leading cities in Australia.
>
> "In Germany, we find a curious situation which can only be described as a mixture of oligarchy and counter-primacy." [24]

33. It is important to keep in mind that the primacy of large cities is sustained by non-economic factors also. Clark observes: "It is easy to distinguish the factors which are making for the increasing primacy of Paris—the concentration of so much political, administrative, educational and cultural authority there. Similar causes, deriving from the political and social structure of the country, not economic causes, are probably at work in Latin America, Greece and other countries." [25]

34. The experience of Paris is very relevant. A study of governmental measures for the promotion of regional economic development in different countries of the world has the following to say about the French experience:

> "The example of France has important policy lessons for other countries as well.
>
> "As first, the most obvious fact was the excessively rapid growth of the Parisian agglomeration, and the aim stated more or less explicitly was the halting of this growth or even the reversing of the process. It was soon recognized, however, that this was neither possible in view of the expansion of population and the relative development of the secondary and tertiary sector of the economy, nor desirable if Paris was to continue to play its role as capital to the full and, on a European scale, to balance the large population centres of the neighbouring countries. The Paris region has furthermore already been organized and a development programme established in line with the growth expected. The efficacy of the measures taken to encourage regional development should not therefore be denied simply because the development of the Parisian agglomeration has continued." [26]

35. To come back to the relevance of this discussion from the point of view of environment, it may be pointed out that policies which suggest development of cities and towns in a specified population size group (say, cities of 300,000 or towns of 50,000) tend to oversimplify issues. In real life, one has to contend with cities of all sizes, so environmental problems must also be considered in cities of all sizes, no matter how serious the pollution problems are currently in the largest cities. The following observation by a British environmentalist deserves close attention:

> "Perhaps the most radical policy would be to accept that within half a century or thereabouts the best qualities of urban life will be the goal of most people. Instead of bemoaning the drift from the land and dissipating resources into propping up faulty rural systems, it would be more positive to plan constructively for the variety and number of urban settlements needed to fulfil human aspirations. Such a policy should seek to 'get ahead' of the drift by diverting available resources into the development of strategically planned settlements and relating these to the management of rural resources." [27]

36. To sum up, the preoccupation with size of cities is likely to be futile in the absence of policies influencing the settlement pattern as a whole.

Population redistribution

37. In a recent review of policy aspects of population redistribution in the United States of America, P. A. Morrison observes:

> "The dynamics of migration have an important bearing on how public policies might influence redistribution of population. The net effect of migration ordinarily is small, relative to the much larger (but, for the most part, self-balancing) gross flows into and out of a locality. But the flow into an area—the 'pull' of economic attraction—is potentially responsive to policy measures. Population redistribution could, in theory, be influenced by policies that

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[22] L. Lefeber and M. Datta-Chaudhury, *op. cit.*, p. 184.

[23] Colin Clark, *Population Growth and Land Use* (New York, St. Martin's Press, 1967), pp. 323-326.

[24] *Ibid.*

[25] *Ibid.*, p. 323.

[26] International Information Centre for Local Credit, *Government Measures for the Promotion of Regional Economic Development* (The Hague, Martinus Nijhoff, 1964), p. 71.

[27] Robert E. Boote, "Impacts of urbanization on the environment", paper presented to the Rohovot Conference on Urbanization and Development in Developing Countries, 16-24 August 1971, p. 5.

operated on the inflow side of migration to affect the *destinations* of moves "[28]

38. An important point made by Morrison is that about public policies arbitrarily influencing the economic effectiveness of certain areas He maintains that "any effort to modify population redistribution must include a thorough assessment of these activities, which are themselves essentially 'hidden policies' for redistribution."[29]

39. Morrison refers to "spontaneous growth centers" (SGCs) defined as metropolitan areas that are drawing migrants at unusually high (net) rates

40. In the Union of Soviet Socialist Republics, regional science experts have designated "spatial production combinations" (SPCt) at different levels which include "spatial production complexes" (SPC) M K Bandman observes that,

"Since every SPC is a link of the national economy as a whole, we may consider as optimal only that complex with which the state programme of producing output by branches of specialization and creation of living conditions necessary for the people is fulfilled with minimal social labour expenditure "[30]

41. For the economy of an SPC, the infrastructure of non-material production spheres is of great importance As Bandman explains·

"As productive component of the infrastructure we consider construction and energy bases, transport facilities, engineering communications and servicing facilities, water supply installations and other elements used jointly by the whole complex and all the industries Cultural, instructional, health, trade institutions, public restaurants, passenger transport and other elements of the service sphere as well as housing fund, administrative and science organizations form the social part of an SPC infrastructure The infrastructure is formed in accordance with the general level of development of productive forces in the complex, and location of its objects is determined by specific conditions of funtioning of the rest of the economic elements of an SPC and its population as well as demand for them."[31]

42 In Japan, the problem of rural depopulation has been engaging the attention of planners, particularly since 1967, when the new name "Kaso" (excessively sparse) was applied to less densely inhabited areas and depopulated areas The concern for Kaso areas is mainly based on the recognition that rapid out-migration of the young adult population from rural communities is resulting in an increasing percentage of old population in rural areas, decline in family income, decrease in the number of working members, increase in the cost of cultivation and relatively low productivity.

43 In the context of environment, it is necessary to take note of the consequences of rural depopulation As Toshio Kuroda asserts

"There are serious implications of air pollution, water pollution, traffic congestion, inadequate housing, and noise in the great urban areas. On the other hand, problems of maintaining social, economic and cultural functions are being aggravated in rural depopulated areas Taking into account the urgency of ensuring the people's health and welfare and the necessity of using rationally the extremely limited land surface, a new comprehensive environmental development must be devised "[32]

44 A problem allied to rural depopulation is that of dispersed population René Eyheralde estimates that in Latin America, approximately 35-40 per cent of the rural population lives in dispersed settlements (under 20 people) The difficulty of supplying public services to such a population should be obvious In the great majority of cases, neither electricity nor drinking-water is available Systems for eliminating waste are rudimentary In such a situation the grouping of the population becomes an efficient tool for the effective organization of rural societies The Latin American programme of rural urbanization is relevant to the study of new forms of settlement. But as Eyheralde cautions, "Unfortunately there do not exist yet in Latin American countries enough valid examples of the creation and functioning of agricultural villages within this continent, it is, therefore, advisable to be cautious in their indiscriminate promotion "[33]

45 A point of view has been expressed that urban housing tends to receive a higher priority than rural housing in developing countries in spite of the fact that "rural housing cannot be ignored if Governments wish to reduce the drift of a large number of people from rural to urban areas "[34] But the trend of rural-urban migration does indicate the strong pull of cities in spite of the acute housing shortage in cities It is doubtful if improved rural housing alone will make a significant change in the volume of rural-urban migration To say this is not to argue against accelerated programmes of rural housing, but the relevant issue here is whether rural housing can stem the tide of migration It is well-known that young men and women are reluctant to stay in villages and they are the first to migrate to cities. It

[28] Peter A Morrison, "Policy aspects of population redistribution in the United States", in International Union for the Scientific Study of Population, *International Population Conference, 1973* (Liège, 1973), pp 393-394

[29] *Ibid*, p 394

[30] M [illegible]
Model [illegible]
birsk, [illegible]
tute of [illegible]
1972), p 3

[31] *Ibid*, p 6

[32] Toshio Kuroda, "Trends in internal migration and policy questions in Japan" in International Union for the Scientific Study of Population, *International Population Conference 1973* (Liege, 1973), p 410

[33] Rene Eyheralde, "Rural resettlement in agricultural villages in Latin America" in *Rural Housing—a Review of World Conditions* (United Nations publication, Sales No E 69 IV 8), p 123

[34] C B Patel, "Rural housing in the Economic Commission for Asia and the Far East region and experimental work in India", in *Rural Housing* . . p 32

is doubtful if the lack of good housing in the rural areas, as such, motivates them to leave their villages. Unless there are adequate employment opportunities in rural areas, the drift to the towns and cities is inevitable. In India, in the very first five-year plan period (1951-1956), an experiment was made in remodelling an entire village because it was felt that in the rural areas environmental sanitation, water-supply and the disposal of human waste were more important than the mere construction of houses. This experiment was not successful. It was realized that improvement in housing conditions has to be related to improvement of the economy of the village. The villagers found it difficult to repay the loans advanced by the Government because "the general productivity and especially that of agriculture had not increased." [35]

46. Thus, a rural housing policy, to be successful as an instrument of a policy of population redistribution, must be part of an agricultural policy designed to accelerate agricultural productivity and rural incomes.

47. Even in the developed countries of Europe, it has been recognized that rural housing problems have to be dealt with "not so much as part of a housing policy." [36]

48. In the industrial countries, housing policies should be linked more effectively with industrial policies. An eminent architect and planner of environment asserts:

> "The large American new communities of recent years . . . demonstrate another inadequacy of the private entrepreneur: his failure to combine industry and housing. Park Forest did start out by earmarking an area for industry, but it did not bear fruit. There was no particular leverage available to the builders with which to attract industry, and the profitable creation of housing absorbed their attention and energies. A genetic reason for such failure may be that characteristically open-planned industry cannot compete for land at the prices that privately produced houses can command, particularly with the bait of resale at a profit. Thus again we are back to the proposition that as long as land is a freely disposable private commodity and speculative profit is a basic factor, large-scale logically related development is not going to take place, though the volume of development may prove large." [37]

49. Limits of space precludes the consideration of several other related issues, such as community development programmes, resettlement schemes, rural works programmes, issues in transportation and regional planning. There has been no discussion of numerous programmes of incentives, tax relief and other fiscal concessions given to industries to move out of congested urban areas or establish new units in neglected areas, depressed pockets etc. The literature on these aspects is massive, and it is possible to make an inventory of a series of specific measures concerning locational policies and measures directed towards influencing the out-migration from rural areas. It would be pointless to do so, however, because each country is unique in its own way and no standard solutions can be prescribed. Yet there is a consensus in both the market economies and the centrally planned economies, and in the developed countries as well as in the developing countries, that comprehensive regional planning offers the best solution to the problems under study. It is important to realize that consideration of single problems and single solutions will not succeed. What is needed is a holistic view and total solutions. A comprehensive approach to regional development has been advocated in several United Nations studies. In this context, particular reference may be made to the United Nations study [38] of regional development, which is the outcome of a series of visits paid by teams of experts appointed by the United Nations to various selected regional development projects. Such studies based on actual field-work provide a valuable supplement to theoretical models and empirical analyses.

Conclusions

50. There is a tendency throughout the world for environmental problems to become equated with pollution problems of big cities. However, this is still a rural world; and it is, therefore, necessary to get a proper focus by paying more attention to problems of rural environment. Otherwise, the talk of quality of life would refer only to the *élite* and not to the masses.

51. There is no doubt that, in the metropolitan areas and big cities throughout the world, problems of environment are most acute and the need for containing the "human avalanche" of migration is great, but it does not follow from this that rural-urban migration is an evil. In fact, such migration has played a positive role in relieving rural poverty. Unless there is acceleration in rural development and a reduction in rural-urban disparities, and unless the image of the rural areas improves, such migration is bound to persist.

52. The advocacy of growth centres, market towns etc. often over-emphasizes the spatial aspects at the cost of economic aspects; and, therefore, programmes of dispersal of industries, by and large, tend to be ineffective.

53. The concern for development of cities and towns of a particular size group tends to oversimplify issues. Controlling things at the urban level without touching the rural reservoir of population is bound to be fruitless.

54. While the need for rural housing is great, it is doubtful if improvement in rural housing will by itself slow down rural-urban migration. The crucial factor is employment.

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[35] *Ibid.*, p. 34.

[36] United Nations Economic Commission for Europe, *loc. cit.*, p. 46.

[37] Albert Mayer, *The Urgent Future: People, Housing, Region* (New York, McGraw-Hill, 1967), p. 86.

[38] *Selected Experiences in Regional Development* (United Nations publication, Sales No. E.70.IV.14).

55. Different countries have adopted different programmes to tackle the problem of excessive urban growth and lopsided regional development, but one of the crucial issues is' whether the primacy of big cities can be contained There are very few success stories A large number of economic as well as non-economic issues are involved It is possible to argue that an increase in the primacy of big cities is not necessarily an index of failure of policies of dispersal of industries, development of small towns and regional planning as such

56 A better management of space and population is possible through more sophisticated techniques of regional planning, but regional planning becomes a political issue at the level of implementation The success of regional planning would appear, therefore, to depend upon the political will of decision-makers

57. The population problem in developing countries is not merely the problem of an enlarging gap between the birth rate and the death rate, but also a problem of stagnation of the social and economic structure

58 There has been an over-emphasis on the growth of population and a neglect of the distribution of population *both in developed and in developing countries.*

59. The recent energy crisis calls for a restatement of the population problem, taking adequate note of such critical issues as mass transportation, the impact of the increasing cost of transportation on the dispersal of industries and the possible slowing-down of suburbanization, as well as a host of related issues There should also be a greater concern for human settlement and alternative strategies for modifying the settlement pattern directed towards improving the quality of life

HUMAN SETTLEMENTS: MAN-MADE ENVIRONMENTS *

United Nations Environment Programme

DEVELOPMENT AND ENVIRONMENT

1. In fashioning their first shelters, human societies have set in motion a dynamic and potentially highly productive process of adapting their natural habitat to their needs and liking. But when they built the first settlements in the more fertile river basins of Africa, Asia and Europe (a mere 10,000 years ago), different societies took the first tentative steps on the long road of development. Struggling first to survive and then to develop, societies have applied increasingly complex technologies and, in the process, degraded the natural environment in a very short time. Two interpretations of this phenomenon are possible. The more obvious one is: a slow biological evolution and socio-economic development; and then suddenly man destroying the natural habitat that sustains him. Or, the current condition can be seen as an entirely new stage of human and environmental development: man supplementing nature and forming, by degrees, an environment presumably more efficient as an agent of economic development; and, at the same time, also more convenient as human habitat. [1] Total accommodation to and dependence upon the natural environment has shifted gradually to partial and increasing "control" of the environment. By deliberately applying the sciences and the technologies societies already possess (and, it is hoped, working with nature rather than blindly destroying it), one may be able to improve the natural habitat. The essential relationship to be understood in this context, then, is the interaction between the "controlled" man-made environment and the natural environment which man must respect in order to survive and develop.

2. Social progress and economic growth, population, the natural and man-made resources, environment and the development of human settlements are closely connected and crucially important factors in the development process. Their interaction determines the direction and the pace of development. But the way in which different societies use these processes in their development and distribute the benefits obtained through "deliberate" development, and what attitude they assume towards the environment are determined by the value systems and the political processes of decision-making that operate in their respective cultures. As a consequence, a unified socio-economic, environmental and admininistrative-political approach to planning and to plan implementation, appropriately suited to these value systems and processes, should be adopted when and where development objectives, policies and strategies, or development projects and programmes are being conceived, realized and managed. Before such an approach can be applied, however, certain obsolete economic concepts and certain emerging policies still accepted as inescapable constraints to development need to be dispelled:

(a) *Historical determinism:* a notion that all development must follow the patterns evolved in the societies that are currently industrialized and affluent, both "free-enterprise countries" and/or "market-controlled economies", as well as those "centrally planned" and/or "Government-controlled", even though many of their social and environmental phenomena are counter-productive from the point of view of human progress and the human qualities of life;

(b) *Economic determinism:* a notion that, in the context of development, economics is an "exact science" like those dealing with nature and has its "immutable laws" which man seeks to understand and perhaps harness, but cannot change; that "economic efficiency" motivates and guides development, which, in turn, must produce economic benefits as great and as fast as feasible, regardless of the social cost, human hardship or environmental damage, so that the material benefits of development should reach more people in the long run;

(c) *Technological determinism:* a notion that effective use of modern technologies requires ever-greater agglomerations of production services, people and facilities in order to draw benefit from the scale of operation, increase the economic effect of development, broaden the distribution of goods and reduce the cost of management, even though these objectives tend to impair the human qualities of life and turn the once "free" external economies into increasingly costly "externalities";

(d) *Ecological determinism:* a notion that the ecological systems of the earth, created by evolutionary changes, are the only viable ones, and since their absorption capacities and recycling tolerances for man-made pollution are absolute and finite, they cannot interact productively with man-made environments; and

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* The original text of this paper (E/CONF.60/SYM.III/20) was submitted to the Symposium on Population, Resources and Environment, Stockholm, 26 September-5 October 1974.

[1] See P. Spreiregen, "The skin of the earth", *Way Forum, Special Issue on the City* (Brussels), No. 63 (December 1966).

that there is, owing to this incompatibility, an absolute and finite tolerance of the earth's total ecological system for man-made development as represented by industrial societies;

(e) *Centre-periphery conflict* a notion that for the sake of economic efficiency, there must be, in the course of development, a concentration of production and people, of economic power and business, of national wealth and political power in the dominant cities and regions in individual countries and in the dominant countries of the world; that this concentration must occur at the expense of the "marginal people", the "peripheral areas" and the "developing countries" as a phase in the long-term process of national and world-wide economic development which will, in due course, "spread" around the globe,

(f) *The equilibrium mechanism* a notion that the "free market" as a self-regulating socio-economic system is endowed with built-in controls (in the form of a continuous interaction between supply and demand), which can and, indeed, do correct automatically any imbalances within and among the different factors influencing development (such as investment, production, distribution and consumption), and, therefore, societies do not need to regulate these processes for the purpose of diminishing the differences between the rich and poor of a country, or to reduce the growing gap between the affluent countries and those locked in a vicious circle of underdevelopment

3. In the continuing process of intensive interactions of man-made environments with the natural environmental systems, the dynamic role of man's societies has been, and continues to be, the essential factor of change The institutions of government, the technology, law and economics, a society's culture and its values are man-made and therefore also capable of being changed by man

4. Human settlements are man-made environments in which the rapidly urbanizing society creates or impedes new economic capacities and enlarges or frustrates the human qualities of life National urban and metropolitan systems have also become, by degrees, the link among the essential and often conflicting processes and problems of our different societies and cultures, the *milieu* in which they confront each other, accommodate to one another or clash For better or for worse these conflicts must be resolved in their metropolitan and urban settings [2] To escape further degradation of life and environment, these man-made systems will have to be so organized and managed that their immediate and cumulative effects on the natural ecosystems are compatible with the ecological tolerances of these systems Then, human settlements and economic growth may become less "ecocidal" However, any meaningful and effective action in the urban field would have to be based on coherent national (and, in many instances, international) policies and strategies for growth as elements of pivotal significance for development in both the economic and the human and environmental sense And this is true of both the developed and the developing countries. The ensuing constructive interaction of man-made and natural systems may only then reduce and repair damages already done and enhance long-term environmental development

The great migration of the twentieth century

5 In the 1950s, about 50 million people were being added to the world population The current rate of accumulation is 75 million a year In 1930, it was about 30 million and it is expected to reach about 125 million by the year 2000 Then the earth may be inhabited by from 6 thousand million to 7 thousand million people Two out of every three will most probably be urban dwellers Socially and economically viable urban environments would have to be built, therefore, in less than three decades for 13 times as many people as in the previous 150 years, and the rate of construction would have to average at least 40 times that of the recent past According to United Nations estimates, the phenomenon of an "over-rapid" urbanization [3] due to an ever-increasing pressure of rural migration is now compounded by a structural change in its destination (see tables and the figure given below) First of all, the addition to the rural population, living in settlements with less than 20,000 people, may equal or even slightly surpass, between 1960 and 1980, that of the preceding 40 years Secondly, the increments to the urban population, those living in settlements with 20,000 people or more, may be considerably larger in the current 20-year period than they were in the previous four decades Thirdly, the "big-city" population, those living in agglomerations of 500,000 people or more, is expected to rise in the same period from 96 million to 725 million Nearly all of the increments in the world's rural and small-town population would occur in the developing countries At the same time, the trend of accumulating a rapidly growing share of the world's urban population is also expected to continue in the developing countries

[2] The following remarks by Maurice Strong from his address at the Meeting of Experts United Nations Conference-Exposition on Human Settlements, Vancouver, 8 May 1973 are appropriate "Within 30 years the human race will have crossed a fateful and astonishing historical interlude Man will be living for the first time in a predominantly urban plant . [Communities of more than 20 000 people] will be growing at twice the over-all rate of population growth Cities with more than 2 million may be growing twice as fast again .. The majority of new settlements will be in the poor still developing lands where the resources are grossly and pitifully inadequate The changes that are looming could come with such speed and on such a scale that they threaten to overwhelm us—sometimes before we can even define their nature I am convinced that if there are eco-disasters in the next decade or so, they are likely to occur in the large cities of the developing world"

[3] "Over rapid" in terms of the growing discrepancy between the very fast rate of urbanization the relatively low rate of economic growth and the still slower rate at which urb[illegible] employment opportunities become available to the [illegible] equipped rural migrants

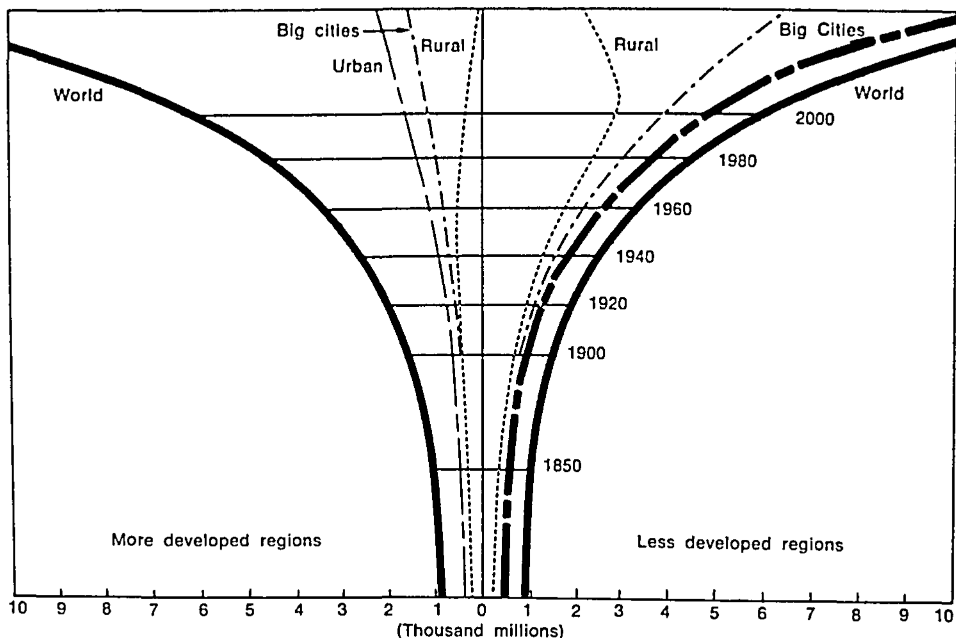
TABLE 1. WORLD POPULATION 1920, 1960 AND 1980

Type of settlement	1920	1960	Increment	1980	Increment
World population	1,860	2,994	1,134	6,264	1,275
Rural and small town	1,607	2,242	635	2,909	667
Urban	253	752	499	1,360	608
(Big cities) . . .	(96)	(351)	(255)	(725)	(314)
More developed regions	672	977	305	1,189	212
Rural and small town	487	544	57	516	22
Urban	185	433	248	623	190
(Big cities)	(80)	(212)	(132)	(327)	(115)
Less developed regions	1,188	2,017	829	3,080	1,063
Rural and small town	1,120	1,698	578	2,343	645
Urban	68	319	251	737	418
(Big cities)	(16)	(139)	(123)	(398)	(259)

SOURCE: "World urbanization trends, 1920-1960", *International Development Review*, No. 1 (United Nations publication, Sales No. E.68.IV.1), pp. 9-20. The developed regions include all of Europe, Japan, Northern America, the Union of Soviet Socialist Republics, Temperate South America, Australia and New Zealand. The developing regions include East Asia (excluding Japan), Middle South Asia, South-west Asia, the Caribbean, Tropical South America, the middle American mainland, all of Africa and Oceania (excluding Australia and New Zealand).

6. The following facts emerge from these estimates. In 1960, the developed regions of the world had a rural population of 544 million and an urban population of 433 million, of which 212 million were in large cities. In the developing regions, the net additions to the 1960 population (2,017 million) may amount by 1980 to 645 million rural and 418 million urban inhabitants, with 259 million in the big cities. Thus, from 1960 to 1980, population growth in the developing regions is expected to exceed the total 1960 population in the developed regions, with the overage appearing in the big-city population with an increase of 259 million, compared with an increase of 115 million in the developed regions; and in the rural and small-town population with an increase

Urban and rural world population, by more developed and less developed regions, 1850-2000



SOURCE: "World urbanization trends, 1920-1960", *International Development Review*, No. 1 (United Nations publication, Sales No. E.68.IV.1), pp. 9-20. The developed regions include all of Europe, Japan, Northern America, the Union of Soviet Socialist Republics, Temperate South America, Australia and New Zealand. The developing regions include East Asia (excluding Japan), Middle South Asia, South-west Asia, the Caribbean, Tropical South America, the middle American mainland, all of Africa and Oceania (excluding Australia and New Zealand).

of 645 million, compared with an increase of 22 million in the developed regions By 1980, the urban population of the developing regions would be nearly equivalent to the 1960 urban population of the developed regions—418 million compared with 433 million

7 The grim implications of these projections for the developing regions of the world are these

(*a*) Between 1960 and 1980, the developing countries would have to provide at least tolerable levels of living, public services and facilities for more than 1 thousand million new citizens, in addition to improving the grossly inadequate conditions of some 2 thousand million people in the rural areas and small towns,

(*b*) Between 1960 and 1980, the developing countries would add 418 million to their current urban population, meaning that they would have to create in 20 years urban environments and productive employment for nearly as many people as have accumulated in the cities of the developed regions of the world over the past 150 to 200 years or more;

(*c*) The big-city population in developing countries would increase between 1960 and 1980 by nearly 260 million (which is considerably more than the number of people who now live in the large cities of the more developed countries) and create in 20 years metropolitan agglomerations equivalent in size to those that existed, in the 1960s, in the developed countries

8 To sum up, the developing countries would have to provide employment and a tolerable environment to as many big-city dwellers as currently live in such metropolitan cities of the developed world as Paris, London, Moscow, New York and Tokyo; and the huge urban industrial complexes, such as the Eastern Seaboard megalopolis in the United States of America, the mega-region in north-western Europe and the Tokaido Corridor in Japan; and provide urban services and facilities for as many people as currently inhabit all urban areas of the developed countries These are unprecedented tasks surpassing by far anything done at any time, in any place, by any known society. It is entirely inconceivable that they can be accomplished with the economic capacities, technologies and the material and capital resources now accessible to the developing regions of the world from any quarter

Current trends in urbanization

9 The current rapid expansion of cities and the explosive growth of metropolitan agglomerations in the developing countries are relatively new phenomena As industry becomes the source of livelihood for progressively larger populations, people tend to move in pursuit of a better life, an aspiration common to all mankind In this era, the city embodies the basic conditions for the fulfillment of this aspiration. It therefore attracts with elemental force those whom insufficient land and conditions of tenure could barely sustain in the past and whom new agricultural technologies now make "superfluous" at an accelerating pace. But it also attracts with equal force the "redundant" people from the smaller cities and the towns bypassed by modern industrial development. The current migration is the largest and most important the world has ever experienced, not only because it is universal, but because it conditions most directly the distribution patterns of production and people, and because it has unleashed a chain of drastic changes around the world

10 Economic and social factors have motivated the rural-urban migration in the past and they continue to motivate it now. There are, however, fundamental differences in the two situations The industrial revolution of the nineteenth century in Europe and North America (and the more recent ones in some other countries) proceeded at a relatively moderate pace Not without shock, to be sure, nor without hardship for the emerging industrial worker. In the main, the market has regulated economic development Industrialization and urban growth occurred in the most advanced areas. And world trade favoured the new industrial countries As cities grew, a new urban structure gradually took shape Now, the headlong rush to the cities of Africa, Asia and Latin America is most massive and rapid in their least affluent areas Their natural resources are still underdeveloped and the tools of production and capital resources remain grossly inadequate Currently, these differences are becoming even more pronounced In the more developed countries, industrialization and general economic growth still appear to create new jobs in step with further urbanization Indeed, many highly industrialized countries must now import labour. However, the developing countries are already "over-urbanized" in the sense that their industries and related activities cannot employ all the young men and women who reach working age Nor can they employ all the rural people who must migrate to cities Economic and social problems and problems of government and management multiply as masses of uprooted rural people, unskilled and poorly educated, converge on the capitals and metropolitan cities

11. In the developed areas of the world, the urban and environmental crisis has taken the form of "megalopolitan" development, in general an unplanned, unanticipated and unwanted concentration of activities, structures, services, things and people in gigantic urban industrial complexes And in the developing regions of the world, a relentless and chaotic agglomeration of people and poverty goes on and on in huge, amorphous metropolitan regions expected to accumulate by the end of the century 15 million or 20 million people, or even 30 million or more Here the explosive expansion is less due to the "pull" of economic growth and improved human conditions, than it is due to a massive flight of rural people from misery, hunger and disease. Each of these regions is an incipient "megalopolis"—less the productivity and resources available to the developed countries. Yet, the crisis must be seen also as a manifestation of technological and economic growth which promise abundance but which challenge the ability of

the world's societies to accept change and use the immense new productivity truly to improve the human condition everywhere.

12. Available evidence indicates that metropolitan regions, rather than the small towns and cities of intermediate size, will continue to grow rapidly. The difficulties so far connected with metropolitan regions and the "megalopolis" will also grow progressively more acute in the immediate and near future, unless, of course, the highest priority is given in terms of resources and human capacities to resolving the urban crisis through investment policies stimulating more manageable forms of settlement. [4] The long-term total impact of urbanization is highly positive. The city leads in industry, incomes and culture. If planned for comprehensively on the regional scale, it could also become an effective means of eliminating existing disparities between town and country. Instead of spending scarce resources on attempts to contain rural people in their marginal subsistence, practical measures are needed now to facilitate urbanization in carefully selected locations.

13. The traditional ways and communities are disintegrating under the impact of urbanization, industrialization, mass communications and an expanding world market. The urban services and facilities are already unable to satisfy the rapidly growing human, social and cultural needs of their citizens, even in the highly industrialized countries. But the real threat to the environment is not the current rapid growth of population nor the more intensive application of new technologies. As has been stated, it is rather the continuing concentration of the means of production and of economic and political power in dominant areas and in dominant countries. These difficulties are then compounded by the quest for economic growth *per se* and short-run individual and corporate gain, regardless of the long-term investment interest and welfare of the wider community and the country.

[4] Urbanization usually tends to continue at varying rates until the urban-rural ratios reach about 4:1. Then the process usually slows down, until land, employment and mechanization reach ratios capable of creating a sufficiently high productivity in agriculture, thus securing for agricultural workers' families incomes comparable to those already attained in the city. Only 3 per cent of the population of the Netherlands depends upon agriculture for its livelihood. Their cultivation is highly efficient and productive. By the end of the century, this figure may drop to as low as 1 per cent. In the United States of America, the figure is now about 5-6 per cent and is decreasing.

Underdevelopment and resources

14. The world's known natural resources are unevenly distributed. Capital resources and technology, their essential counterparts in the development process, have assumed in recent history even more unbalanced patterns. Illustrations of this phenomenon are that less than one third of the world population lives in the more developed countries and only one seventh in their urban industrial areas; that agriculture tends to be less advanced in the developing countries, where it is still one of the chief sources of livelihood; and that the gap between the living conditions in the industrialized countries and the remainder of the world continues widening (see table 2).

15. The worse physical phenomena of underdevelopment are concentrated in metropolitan agglomerations; but the resources available to the developing countries to deal with the crisis are extremely limited. According to a recent analysis, [5] the position of the developing countries is worsening. For example:

(*a*) The developing countries represent more than two thirds of the world population, but their gross national product (GNP) totals only 12.5 per cent of the world total. Consequently, the one third of the

[5] D. Vejnovic, "The rich are becoming richer, the poor poorer", *Vijesnik* (Zagreb), 22 August 1973.

Table 2. World population and gross national product, by more developed and less developed regions, 1960 and 1970

	Population (millions)				Gross national product (thousands of millions of dollars)				Gross national product per capita (dollars)	
Area	*1960*	*Percentage*	*1970*	*Percentage*	*1960*	*Percentage*	*1970*	*Percentage*	*1960*	*1970*
World	3,000	100	3,600	100	1,350	100	2,640	100	450	730
More developed regions	950	32	1,050	29	1,130	84	2,240	85	1,190	2,130
Europe [a]	640	21	700	19	530	40	1,070	40	820	1,530
North America	200	7	230	7	540	40	990	38	2,700	4,300
Oceania and Japan	110	4	120	3	60	4	180	7	550	1,500
Less developed regions	2,050	68	2,550	71	220	16	400	15	100	157
Asia	1,570	52	1,920	53	130	10	240	9	95	125
Africa	270	9	350	10	30	2	50	2	120	143
Latin America	210	7	280	8	60	4	110	5	320	393

Source: Willem Brandt, "World resources, their use and distribution", in J. Barratt and M. Louw, eds., *International Aspects of Overpopulation* (London, Macmillan, 1972).
[a] Including the USSR.

world population living in the more developed parts disposes of seven eighths of the global GNP,

(*b*) The gap is rapidly widening. The ratio of *per capita* income of the developing countries compared with the developed countries was 1·6 in 1900, 1.7 5 in 1930, 1 10 in 1960 and 1·14 in 1970. In the year 2000 it is expected to be 1:25;

(*c*) The *per capita* income of the 26 least developed [illegible]

[illegible] States of America) was 1.40,

(*d*) In the period 1966-1970, the *per capita* income in the developing regions of the world amounted to $210, but the average yearly increment in *per capita* incomes in the developed regions was, in the same period, $207. How disadvantaged the people are in the developing countries is also evident from the fact that in 1971, 10 multinational corporations have added in their operations values of $3 thousand million or more This amount is higher than the gross national product of at least 86 States Members of the United Nations.[6] Furthermore, 38 corporations (most of them multinational) accumulated in 1970 in sales alone $3 thousand million or more, an amount reached in terms of gross national product by not more than 60 countries [7] Only 19 countries had a gross national product higher than the $28.3 thousand million realized in sales by the first ranking multinational corporation [8] On the other hand, in 1970, the two leading industrial countries spent $78 thousand million and $65 thousand million, respectively, on their defence establishments. Of all the countries in the world, only nine (including those two) were able to accumulate such amounts in gross national product in the same year.[9]

A NEW SOCIAL STRUCTURE

16 In most countries, development manifests itself in two separate processes that coexist in an exceedingly loose relationship The first consists of a set of large "productive" projects involving only small areas of the country and benefiting, in the short run, only a small part of the country. They are expected to build the country's infrastructure and industry, and to make available more equally the benefits of the wealth thus amassed in the long run The second process is, in fact, a struggle for survival until such time as large-scale development matures and becomes operative and adequately productive. It encompasses a variety of programmes, mostly social in nature. For instance, "community development" has been combined in some cases with agricultural "extension" to increase food production for the growing urban consumption. Some rural people have thus begun to participate in the national development effort as both producers and consumers In other cases, handicrafts and cottage and small-scale industries have been regrouped in villages and towns, and organized as partially mechanized undertakings. They were able to produce for the growing urban markets some of the badly needed consumer goods for which no modern large-scale industry existed Rural and small communities became considerably more attractive in the process, and dormant resources began to contribute substantially to general development

17. Such programmes are obviously useful, but their effectiveness is limited in the long run and the rural masses continue to migrate to the cities where development goes on with more certainty for the future. This "spontaneous" urbanization is, indeed, the principal means by which the economic and social benefits of development can reach increasingly larger sections of a country's population Under conditions of underdevelopment, urbanization often takes the form of "invasion" and "squatting" on vacant land and illegal construction of "shanty-towns" This form of urbanization is now accepted in many areas as being unavoidable A whole new doctrine of "moral justification" and "legality" of squatting and of "borrowing" utilities is beginning to emerge New zoning practices and dwelling standards are also being formulated and enacted in order to bring housing costs closer into line with the economic capacity of the "marginal" people In itself the phenomenon of squatting is a progressive step The provisional community surely is not a slum in any strict sense of the term

18. A high degree of co-operation and planning goes into preparing "invasions" and building squatter towns Political action and a great deal of collective bargaining and negotiation go into securing land tenure and obtaining communal services and employment "Marginal man" really cares for his community and participates in its affairs most actively Yesterday's "ignorant peasants" are learning quickly how to manage their community democratically, with their own families' shelter and livelihood as incentives. The possibilities of a squatter town becoming a stable community are all there But decline and decay are equally possible Owing to a lack of positive and constructive support by the "authorities", the *barriadas* begin to change from "incipient" communities to slums. Wherever the marginal migrant goes as transient or a permanent settler, he has undergone a radical change The "push" away from a declining rural life combines with the "pull" of the city to change his outlook and aspirations As "urban man", he has moved from the traditional landlord-peasant relationship to a new, as yet uncharted, social environment of the squatter town (often by way of the city slum). He now joins with others to promote his and his family's interests collectively.

19 This new social structure is co-operative in nature. With its strong [illegible] -help,

[6] United Nations report of 12 August 1973, as quoted in *Le Monde*, 15 August 1973

[7] "Nations and corporations", *FCNL Washington Newsletter*, January 1973

[8] "Global companies too big to handle", *Newsweek*, 13 November 1972

[9] C Gewirtz, 'Defense cuts held key to US ills", *International Herald Tribune* (Paris), 24-25 March 1973.

management and direct action, it represents a new condition in urban affairs that could also be used as a new development tool, particularly for tackling the many problems of "marginality" by means of community and collective action. Instead, futile aspirations are being promoted. For example, "individual home-ownership" through "savings and loan" institutions at the cost of one quarter or more of the family budget—a device conceivably useful when family incomes are more or less adequate to meet the other essential needs after paying high housing costs, but economically inapplicable and therefore socially meaningless in the developing countries. Much could be learned in this connexion concerning workable approaches, methods and techniques, through pilot projects which would be economically feasible and socially acceptable in terms of the motivations and values of the cultures within which they are meant to operate. These approaches should be designed, however, to bring together citizens and Governments in a real partnership in the political process of conceiving and realizing local urban development programmes as part of a national policy and strategy of deliberate urbanization, thus relating settlement patterns to industrialization, agricultural reconstruction and environmental development.

Planned development

20. The most often-stated objectives of national development are social progress and the improvements of the human qualities of life, and the generally accepted instrument for their achievement is economic growth. But social progress, the increased ability to satisfy human needs, is not an automatic consequence of economic growth. To obtain it, a society must allocate an appropriate share of the wealth it acquires to social development. Indeed, dissatisfaction with the blind pursuit of exclusive economic growth as the almost exclusive motivation for development has led gradually to a more equal distribution between economic growth and social progress in current national development planning. [10]

21. The interplay of the socio-economic activities generated by different societies in the course of past development, together with the settlements they built in the process of development, have produced in recent times a rapid degradation of the man-made physical and social environment and the natural ecological environment. It is these concerns that have caused countries to focus attention on problems of the environment and growth, specifically in terms of human settlements. It follows that to achieve its social objectives, a society must plan for an equitable distribution of the social benefits it can offer; and to maintain and enlarge the human qualities of the environment, it must respect the ecological tolerances of the environment to absorb man-made development. These are, therefore, the main concerns of human settlements.

22. In this context, development planning can be defined as both: (*a*) a model of an intended situation with respect to socio-economic activities, their location and linkages, and the land, structures, landscape and installation needed to house them; and (*b*) a programme of co-ordinated action with respect to the legislative, financial and administrative measures required to negotiate the transition from the present situation to that represened by the socio-economic environmental model. This dual definition implies a commitment to a concept of development through economic growth (in the quantitative sense) and through social change (in the qualitative sense). It also requires a continuing interaction and total integration of the two streams of development planning, namely, the construction of a technical (socio-economic and environmental) model, and the formulation of a political (legal, fiscal and administrative management) plan of action for its implementation.

23. Recent experiences in "deliberate" (or planned) development have demonstrated the fallacy and gross inadequacy of using traditional abstractions (like national averages for incomes, production and consumption) as quantitative development indicators, and the outright danger of current attempts to "quantify" the human and environmental qualities of life in physical terms alone. The geographical areas of a country differ in terms of their natural and man-made environments; their physical, economic and technological resources; the people and skills, their social structure and institutions, the rate of their productivity and levels of living, and the state of their health and education. The totality of these elements, some quantifiable, others not, account for the apparent uniqueness of each region.

The regional approach

24. Once these regional variations are recognized. national development strategies must try and strike a balance between two extreme positions: (1) to equalize conditions in all areas as soon as feasible conceivably at the expense of total national growth; or (2) to favour areas most likely to grow rapidly in order to maximize national economic product and generate, in the long run, progress everywhere.

25. Planners and policy-makers are becoming increasingly aware of the need for both economic and social progress. They are also beginning to acknowledge the importance of settlements for both. The concept of settlements and planning for their development must be

[10] The concept of gross national product (GNP) is now suggested to be replaced or at least supplemented by the concept of national economic welfare (NEW) as the "corrected" version of GNP—corrected (*a*) to "subtract from the conventional contribution these non-material disamenities that have been accruing as costs to our economy whether or not they have been charged against the industries and activities that caused them", and (*b*) "to add in items irrationally excluded from GNP (such as housewives' services in the house, value of expanded leisure and so forth). It is up to us, the public: if we will it we can give up half a percent of conventional GNP yearly growth, in order to achieve perhaps an extra quarter of a percent rate of NEW growth. And a good bargain many of us would judge such a trade off." P. A. Samuelson, "From GNP to NEW", *Newsweek*, 9 April 1973.

seen, therefore, as a regional orientation Human settlements include both the actual areas and locations of residential communities and all the other systems that sustain them A settlements area, then, would be more than a city or the housing sectors and neighbourhoods within it. It would include the economic, cultural and environmental systems which sustain it, the surrounding agricultural regions which supply its food and the transportation and communication systems and the utilities which support it.

26 Many development options are available for societies. Settlements and habitat, as conceptualized here, would appear to imply some sort of regionalization policy. And this implies projecting economic, social and physical environmental development in a given area, over a given time and, presumably, also for the benefit of the region's people, in addition to promoting national growth to which all regions contribute. In the process of regional development, viable locations are taken up by specific "programmes" and "projects", requisite linkages among them projected, and a suitable framework established for projects of national significance, as well as for those based on local aspirations, initiatives and resources

27. The wide gap between the stated national goals and actual development in real, local situations could thus be bridged Planned regional development tends to resolve conflicts among the many "sectoral" projects and programmes concerning land and location or the use of scarce resources, conflicts arising from the sequence and rate of their implementation; or conflicts opposing man-made development and the ecosystems affected by it.

Regional development planning

28. The "region" emerges as the physical, economic, social and institutional environment in which local growth potentials can be mobilized as part of, and in tune with, national development strategies. Whether this process is productive or counter-productive, from a society's point of view, will depend, in general, on whether regional growth can be induced where it helps, and stopped, in turn, where it may harm man or nature Several propositions emerge from this recognition·

(*a*) The process of regional development can be regarded as the cumulative effect of a complex system of interacting development processes controlled or influenced by governmental and non-governmental interventions and by collective and individual decisions made at the local, the central (national) and the intermediate (or the regional) "levels". Planned co-ordination and integration of these interventions and decisions are apt to influence the interaction among investment projects and investment programmes, thus accelerating (or, if necessary, retarding) the pace of realization of different economic, social and cultural development targets;

(*b*) A regional approach in development planning can facilitate a meaningful "disaggregation" of the national plan and its sectoral components, or promote the assembly of local programmes, plans and projects into larger, more manageable entities, or guide regions with special problems or potentials; or again, identify "growth poles" and implant new ones in strategic locations of developing areas. In either case, regional planning can promote the objectives of national development by judiciously combining the inputs from central sources with local resources, aspirations and action for a better total effect;

(*c*) The concept of planning would have to shift, therefore, from a predominantly sectoral (agricultural, industrial, educational etc) to a comprehensive approach by integrating and adjusting to one another the sectoral developments in a given geographical area, both public and private. This does not mean, however, planning for all sectors in one place, in every detail and at the same time. It has as its objective, rather, inter-sectoral integration within critical areas in which related developmental factors interact through mutual accommodation, thus making their interplay more productive in terms of total development; the ability to mobilize latent resources, reduce the demand for scarce resources or cause less hardship to citizens;

(*d*) Consequently, comprehensive regional development planning would tend to assume in future a highly dynamic role of identifying development possibilities, and stimulating, guiding and controlling development in harmony with national objectives and strategies as well as the capacity of ecosystems to absorb such development As a means of co-ordinating regional and interregional development efforts, it adds to sectoral and intersectoral co-ordination of activities the dimension of geographically defined development, relying on actual resources, people, institutions and infrastructure. The regional planning bodies are bound, therefore, to assume in the future greater responsibilities in the field of deliberate development. And the competence and ability of the central bodies in "interregional planning" will need to be increased, particularly with regard to their functions allocating investment resources to the different regions.

29 It is for this reason that comprehensive regional development has become in many countries an essential tool in implementing national objectives in the vital areas of industrial development, agricultural reconstitution, the restoration and improvement of the environment and the distribution of human settlements As such, it is also an instrument for promoting human development throughout a country and a more equitable distribution of the means of production and welfare, thus providing for the requisite social, economic and geographical mobility of the people.

Settlement systems planning: the city-region concept

30 Planned redistribution of "external ..."
in a given region (through suitable adj

settlement system) could therefore also mould development processes into novel social and environmental patterns that would attract not only the rural migrant, but new employment opportunities; draw benefit from size yet avoid excessive concentration, make urban amenities more accessible to rural people and bring "nature" closer to the urban dweller. To be "productive", growth (as a factor of increasing the gross national product) requires technical and economic efficiency, an increasing agglomeration of activities and people in a given geographical area and a network of settlements to serve these aims. Historically, the settlement systems of the different societies have evolved, therefore, patterns designed to maximize the potentials for economic growth.

31. To realize a more equitable distribution of social benefits and the new human qualities of life that economic growth makes possible, the existing settlement networks must be adjusted accordingly. Making such an adjustment now, however, for social and human concerns can be justified also by the long-run economic gains that would be realized through greater attention to human needs and social progress. Furthermore, it is the same settlement system where the often adverse social and environmental consequences of a region's development and the "finite" capacities of the ecological systems to absorb them, meet and interact. Consequently, the settlement system of a region (or of a country) could assume the dual highly productive role of providing needed environments for efficient socio-economic development, and safeguarding the compatibility between these man-made environments and the ecological tolerances of the wider geographical regions concerned.

32. Carried to a logical conclusion, such an approach leads to the concept of "city-region"—a composite, polycentric system of separate but interacting urban centres (both specialized and diversified), of industrial zones and intensively cultivated areas, of centres of leisure, learning and culture, and of protected lands, all blending into their wider ecological regions. Man can enrich and develop these regions by judiciously applying science and technology in agriculture, industry and building, mobilizing and developing in the process the often latent local resources, aspirations and the people, and mobilizing also the social and economic potentials of the agglomerations of all sizes making up the existing settlement systems.

33. The city-region system is composed of a great variety of economic, social, political and environmental phenomena reacting upon each other ceaselessly. Any plan or projection of such a "mega-system" must encompass at least the following major systems:

(*a*) A social system to further the development of man now become highly productive, disposing of vastly more time and resources for his own development, more thoroughly informed, and, therefore, also better prepared to participate meaningfully in making decisions concerning his own and his community's welfare;

(*b*) An economic system to further the application of science and technology in developing a "growing productivity of man and machine", and an equitable distribution of material well-being made possible through creative participation of citizens in the planning and realization of society's economic growth and human and cultural development;

(*c*) A political system to further the identification and setting of goals and strategies, and the means and methods of development in a continuing dialogue between planners and administrators, and the citizens, through due political processes and a true participation of citizens at all levels of decision-making;

(*d*) An environmental system to further the development of human settlements within larger ecological regions (ecosystems) as the physical framework within which economic and social capacities are being multiplied and the human qualities of life enlarged, an environment in which man intervenes as a creative builder, not a despoiler of nature.

34. To facilitate a meaningful participation in the dialogue and interaction within and among these four systems, a highly sensitive process of planning and monitoring is needed. This system would record, assess and integrate rapidly and effectively into all phases of planned development the potentials and consequences of new technologies and the resulting multiplication of industrial and agricultural productivity, as well as the human need for continued growth and development in dignity and freedom.

35. If so conceived and practised, comprehensive development planning of regional settlement systems could become a truly dynamic instrument of humanizing development and if transforming, at the same time, the current "guessing game" of forecasting on the basis of "current trends" (often misnamed "the planning process") to coherent action-oriented development planning. "Master planning", city by city, would then be replaced by comprehensive development planning of wider socio-economic and ecological regions with their urban agglomerates interconnected by means of "super-rapid transit" and "total communications", interacting with each other, with their own non-urban areas and with other city-regions both near and far. This type of comprehensive development planning could equally serve as an instrument for: (*a*) locating socio-economic activities where they will be most productive; (*b*) maintaining the balance between their adverse effects and the capacity of the ecosystem to recycle them; and (*c*) distributing more equitably throughout the country the social and human benefits created by such development.

Elements of a viable urban policy

36. In these circumstances, a redefinition of the concept "city" as a socio-economic, physical and political entity becomes necessary. A broader concept suggests itself as a closely interconnected and interacting "open" system of both diversified and specialized centres. Within a city-region system, any developing

entre or area can become the starting-point of planned levelopment In some cases, the objective may be the equisite concentration for economic growth and social velfare At other times, it may be the loosening of urban gglomerates for higher efficiency or simply for enarging the human quality of life. The city-region can ake any shape and structure that geography, technology nd human ingenuity can produce. But its main characeristics must always remain an unqualified flexibility nd a capacity readily to respond to continued growth nd to rapid social change. [11] What is suggested here, hen, is not an image of the future city, but the formulaion of ground-rules for a continuing dynamic process of unified and coherent socio-economic, environmental nd political development of regional systems, both as part of national and international development and as a viable framework for planned local development

37 The concept of city-region ultimately implies comprehensive development of extended areas in multicentred urban systems which are efficient economically and desirable socially. Such development will also require new departures in professional training and research, especially with regard to collaboration and communication among the different disciplines involved Joint research-training projects would tend to bring together the professions concerned through an understanding of their respective roles and contributions to comprehensive development planning. Citizens-at-large are the ultimate beneficiaries of development, and their participation in the setting and attainment of goals should therefore be secured The press and other mass media play a most important role in facilitating understanding and acceptance of plans, as well as the understanding and acceptance of the hardships that inevitably accompany development.

38 Some scholars have combined the "biological" and the "sociological" approach to development planning of "human communities", analysing the complex interaction of people, their environment and their activities [12] Others regard "the region" as the proper environment for the efficient accommodation of a greatly enlarged concentration of people and activities inhabiting "megalopolis" [13] The concept of "city-region" as discussed here is related to both these approaches It differs from both, however, in that it establishes ground-rules for a process of a productive interplay among the main streams of development (rather than producing a "regional" or a "community" plan) as a means of creating a human condition that can improve progressively as a result of economic, social and environmental development interacting upon each other, as well as a result of their cumulative contribution to such improvement The great challenge for rapidly industrializing societies, then, is the need to mould, with the aid of contemporary science and technology, a socio-economic, physical and political environment that is worthy of human achievements and of the potentialities of an emerging affluent society.

39 The city-region concept offers itself as a viable approach to fashioning such environments. The principal issue for the developing countries, then, remains to assess the appropriate share of resources they must spend for social and environmental development in connexion with, and as a basis for, industrial and agricultural growth A related issue for developing countries is how to make "deliberate" urbanization a main approach in the planned development of settlements and an essential element of their national development strategies The principal issue for the developed countries, however, is how to negotiate a real change in the pace of action and replace welfare programmes under impressive labels of "urban renewal" and "slum clearance" or "social housing" by a concerted attack on all aspects of urbanization on a scale sufficiently large to make an impact on their national economies and to give impetus to local and regional growth In either case, settlement systems must encompass agglomerations of all viable sizes, from hamlet to metropolis and the city-region, which are themselves made up of interacting systems of centres of different sizes

40 The practice of seeking economic growth at all cost has already led to excessive concern with the variable and often elusive demand on the world market, rather than national needs As a result, the pace and the patterns of urbanization in developing countries are often a direct result of the demand for certain primary goods in the highly developed countries When external resources are sought for such development, however, the stark limitations imposed by the concept of economic efficiency are compounded with political and ideological issues And this restricts even further the access to resources needed to enable the developing pre-industrial countries to put to good use their own natural resources and human capabilities for their own benefit Unless current trends can be reversed, the already overcrowded and congested metropolitan agglomerations of the developing countries will become less and less manageable as agents of development and less and less suitable as places in which to live. However, judicious location of infrastructural projects and industry within a comprehensive regional planning framework could spearhead a productive harnessing of the pace and patterns of urbanization

41 Industrialization and agricultural reconstruction should be planned, therefore, comprehensively, region by region They should be adjusted to each other and suitably matched with infrastructural and environ[illegible]tal

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[11] For a more detailed discussion of the "city region" con- [illegible]

[illegible] a field of study", *Journal of the American Institute of Planners*, vol XXXIX (August 1963)

development programmes. The positive forces of urbanization could then contribute to national development. Industry is often called the "engine" of development. The developing countries look to it, in the first instance, as the principal means of attaining adequate levels of production; and, afterwards, as a means of maintaining continued economic, social and cultural progress. Indeed, industrialization offers the key element in their struggle to break out of the vicious circle of underdevelopment; to begin closing the large and rapidly widening gap between the growth rates of their population and their economies; to create the needed means of resolving the multiplying problems of urbanization and environmental degradation.

42. For the rural-agricultural areas, settlements should be projected in the context, and as part, of comprehensive planning of regional settlement systems. As agricultural reconstruction progresses, the major current functions performed by the intermediate cities and smaller towns (of being service centres and trading places for the farmer's produce and the goods, implements and services he requires) need to be supplemented now by certain other functions. The technology of the recent world-wide agricultural revolution requires fewer men and more land for higher productivity. Concurrently, medical technology and sanitation tend to produce a steady growth of rural populations. Redundant rural people will therefore have to find alternative employment in increasing numbers, first, perhaps, in industries based on agriculture or industries supporting agricultural productivity, and subsequently, in building, in infrastructural development and in other industries that could be suitably based there. This suggests for certain towns the role of "growth poles", and, therefore, also the role of an alternative point of attraction for the rural-urban migration, closer to home than the metropolitan cities.

43. Certain towns located in large agricultural zones far from any metropolis meet the requirements for a real test of the concept of "agro-ville" as carriers of agricultural reconstruction and links between agricultural zones and the metropolis within city-regions. When such towns are located closer to a metropolis, their development must be planned, of course, as a component agglomeration of the regional urban system (or a city-region). Such rural zones will certainly undergo a substantial transformation. From producing staples they should move, preferably, to cultivating intensively products for immediate consumption in the metropolitan markets (such as vegetables, fruit, dairy products and meat). This transformation may imply a higher ratio of employment to land as well as higher productivity, and higher levels of income, living and general well-being than those prevailing in other agricultural areas. They may probably come much closer to the levels prevailing in industrial employment. These factors, combined with judicious investment for expansion of the physical, social and economic infrastructure in the region, may offer the needed incentives and external economies required to deflect (at least partially) from central cities the relentless flow of rural migration and undue concentration of production.

44. In general, new production facilities tend to settle in predominantly urbanized areas near consumer markets, where there is also sufficient labour available and where requisite research, communications and other vital services already exist. Rural-urban migrants follow the same trend in the hope of improving living conditions where economic activity is occurring. As an alternative, the following objectives and policies for regional development, for settlement systems planning and deliberate urbanization have been suggested and are being implemented, at least in part:

(*a*) Establishing, through sufficient infrastructural investment within the wider regions of the already overcrowded metropolitan areas, suitably equipped alternative centres for industry, commerce, culture and residence so as to reduce the pressure on central cities now plagued by rural migration, by physical congestion and other social and environmental problems (examples are Tokyo and the Kinki region in Japan);

(*b*) Creating, through even larger infrastructural investment, adequate economic opportunities and sufficient social and cultural services in the urban and rural areas of regions as yet underdeveloped, so as to deflect the flow of migration to areas capable of productive growth (examples are Skopje, Macedonia, Yugoslavia, and Nagoya, Chubu region, Japan);

(*c*) Strengthening the economies and infrastructure in rural zones and smaller towns and cities, expansion of their trade and industry, betterment of living conditions through suitable environmental development, improved social, educational and health services and enlarged industrial job opportunities, so as to minimize the need for internal migration and enhance the geographical distribution of employment;

(*d*) Redeveloping the large metropolitan regions and reinforcing their economies by judiciously investing in capital-intensive industries and services for higher productivity as well as improving the quality of life through better environmental design and better social and cultural facilities, so as to obviate or reduce the need for further physical expansion of central cities.[14]

45. In implementing the objectives of national urban policies, much reliance must be placed upon the development of regional infrastructures and their performance in the interest of their larger communities. In Japan, for example, nine planning regions were established in the 1960s. Comprehensive planning of infrastructural development for these nine regions followed, thus recognizing its essential contribution as a major means for achieving regional and urban development objectives, consistently with national development planning. Unified regional infrastructural systems integrating the different modes of transportation

[14] "Report on the 1964 Mission on Urbanization and Regional Development" (TAO/Japan/2).

and communications, the power network and the utilities are the probable solution.

46 At the current point of development of the world's societies the setting for any further progress has shifted to the great metropolitan concentrations. These exploding urban formations are the places where the essential economic, political and social processes and problems of the world's societies come together Their interaction is becoming increasingly counter-productive However, mutual accommodation and adjustment could render their interplay highly productive and, thus, also more effective in terms of material wealth, delivery of services and social well-being as well as in terms of human qualities of life The great metropolitan areas of the world demonstrate most dramatically the commulative stresses imposed by man-made development upon nature's ability to recycle the growing concentration of industrial and other man-made wastes But the interaction of the two environmental systems does not have to be destructive of nature and man Technologies are known that can stop pollution at its source The argument that their application is "uneconomic" cannot stand What "economic value" could be put on human survival and well-being? As a world society the United Nations possesses adequate economic and material resources and the required human capacities and skills to accomplish this task everywhere. [15]

[15] The urban and environmental crisis is a challenge to human sense and to the political sense of the community of [illegible] where its gravity and urgency was underscored by recommendations for (a) a continuing programme of environmental improv [illegible] "areas [illegible] region" [illegible] mental [illegible] the United Nations in order to "maintain the momentum of the United Nations Conference on the Human Environment in this area" The General Assembly approved the convening of a Conference/Exposition (on human settlements) "the preparation for which should generate a review of policies and programmes national and international, and should result in the selection and support of a series of demonstration projects sponsored by individual countries and the United Nations" The Assembly also accepted the offer of the Government of Canada to act as host to the Conference-Exposition, at Vancouver in the spring of 1976 (General Assembly resolution 3001 (XXVII) of 15 December 1972)

SOME ISSUES RELATING TO POPULATION DISTRIBUTION POLICIES *

United Nations Secretariat **

BACKGROUND INFORMATION

1. The United Nations has been increasingly concerned with the issues and problems raised by urban growth and development over the past two decades, as cities have begun to account for increasing proportions of the world's population, thereby becoming key sectors of national economies. Beginning in the mid-1950s, emphasis was placed upon problems caused by rapid urban growth, such as community development and social welfare. Recently, emphasis has shifted from concern with specific problems to a better understanding of the process itself.

2. The United Nations, in co-operation with the Government of the United Kingdom of Great Britain and Northern Ireland, organized an Interregional Seminar on New Towns, which was held in London from 4 to 19 June 1973. The purpose of the Seminar was to identify the key factors that should be considered in formulating national urbanization policies, and to explore the possibilities of using the "new towns" concept as a tool in creating a desired pattern of urban settlements in developed and developing countries.

3. The following is a summary of issues, problems and policies discussed at the Seminar which are of direct concern to this paper. The work of consultants Lauchlin Currie, Ernest Weissmann and Kazimierz Dziewonski, and material from other United Nations publications are used to support various points raised by the consultants and seminar participants.

Past and present trends

4. The total world population may reach nearly 7 thousand million at the end of the century. By that time, about half of this number will live in urban areas. During the 1970s alone, an estimated 490 million people will need some urban space. Today, great concern is felt for the dramatic impact of high population growth rates and urbanization on the present and future conditions of human settlements in the developing countries. Rapid shifts in population distribution and growth, together with uneven distribution of economic activities, confront cities, towns and villages with a sense of desperate urgency about urban development and priorities in national development planning.

5. In spite of the high rates of migration from rural to urban areas, the world's rural population will also continue to grow significantly, adding to the "push" of population off the land and placing further pressure on already overcrowded cities and towns. Urbanization trends in most developing countries were already resulting in the expansion of single or of a very few large cities in which the bulk of industrial and economic development had taken place. The growth of population in urban areas, however, is not only the result of the inflow of migrants from rural areas, but is further aggravated by the natural increase of the original urban population due to the high fertility rate which still exists in the developing world. In most developing countries, however, there is no frame of reference to assist Governments in deciding alternative strategies for urban development and in defining the nature and function of urbanization. The distribution of population within a country is of the greatest importance for development and can only be considered in the light of a thorough analysis of the existing situation, the ultimate aims of society, the availability of resources and the objectives of development.

National development and urbanization

6. The causes of population increase and massive migrations are well known and they are common to most countries, developed and developing alike. However, the scale and direction of these changes vary considerably among countries with different levels of socio-economic development and population densities. Although problems and policy factors are again largely common to most countries, the attitudes towards urbanization vary.

7. A recent United Nations survey on urbanization and development shows that in national development planning the relationship between urbanization and development is not fully recognized. Failure to consider urbanization as a major phenomenon influencing development has a direct bearing on policy formulation related to all aspects of urban development and has been a basic deficiency characterizing the preparation of development plans during the past decade.

"In many instances the process of urbanization and its effects on the distribution of the population has been misunderstood or ignored and, consequently, the

* Revised version of paper (E/CONF.60/SYM.III/21) submitted to the Symposium on Population, Resources and Environment, Stockholm, 26 September-5 October 1973.

** Centre for Housing, Building and Planning of the Department of Economic and Social Affairs.

analytical basis required for the formulation of coherent urbanization policies is too often distorted The growth of slums and squatter settlements in the cities of almost all developing countries is a clear manifestation of such an attitude." [1]

8. Although many sectoral national planning decisions have implicit urbanization policies, only relatively few countries eventually take urbanization into account and base their national development policies on taking advantage of such a phenomenon as a positive factor From the beginning of the post-war period, many Governments and peoples of developing countries have acknowledged the primacy of economic development and social change. However, government agencies engaged in promoting all kinds of new enterprises, activities and investments have simply not been aware of the long-term implications of their initiatives and of their effects on urban development And, as stated recently by a group of experts, when it became apparent that urban growth demanded serious attention, the reaction was to oppose urban expansion without acknowledging how closely it was connected to development policies sectorally formulated [2]

9. In this regard, the Seminar concluded that the higher levels of urbanization that prevailed in developing countries were not only unavoidable, but might be necessary for rapid economic growth and national development.

> "Urbanization should not be regarded as a negative process; it should be accepted both as a condition for, and the result of, development. Recognition and acceptance of the intrinsic interrelationships between urbanization, modernization of agriculture and overall development are essential for the setting of goals and for the formulation of policies, plans and programmes . . .. The need to give high priority to improvement in agriculture, leading to increased production and the general improvement of living conditions in rural areas is obvious; it must, however, be considered in its own right and not as a means of reducing rural-urban migration." [3]

Urbanization trends will not only continue but may well increase and their effects, both in terms of accommodation of the population and in providing employment opportunities in an urban environment, must be anticipated as a condition for success in any development programme

Growth and urbanization

10 A common theme in the developing countries is a desire to increase the national well-being expressed as increasing the gross net product (GNP), and sometimes coupled with economic and/or societal structural changes. An equally common recognition is that the increase in the levels of national well-being necessarily require changes in the sectoral composition of the national economy, in terms of both GNP component and employment. A whole school of economic thought claims that increased levels of well-being call for decreasing the proportions of the agricultural sector and augmenting the levels of urbanization that currently prevail in the developing countries

11. The need to have a small portion of the total labour force in agriculture was stated by Lauchlin Currie to be evident both from the historical development pattern of today's developed countries and from well-established traditional Keynesian macro-economic principles

12 Increasing the level of well-being in the developing countries requires higher levels of output in all sectors of the economy, particularly health, education, housing and food, and a more equitable distribution of income among all segments of the population. The chief point at issue, then, is whether higher output necessitates urbanization The possibility of attaining a satisfactory rate of growth and a high level of income for a rural population, regardless of its relative size in the total population, depends upon the interplay of two basic economic concepts—productivity and elasticity of demand

13 The advances in productivity in agriculture in developed countries have often outrun or rivalled the advances in industry. The record in the developed countries shows that the increases in agricultural productivity were the result of increasing the capital/output ratio in economic-sized plots of a commercial type In the United States of America, 6 per cent of the labour force produces all the domestic and exported output of foodstuffs and fibres, of which 2 per cent, represented by the larger commercial farms, produce some 80 per cent of the total output. The yields obtained in experimental plots and in the commercial type of mechanized farming in Colombia are far above those obtained in the traditional farming on small plots With the widespread use of modern farming techniques on economic-sized plots, some 14 per cent of the labour force could have produced the harvest of 1960, instead of some 45 per cent In other words, productive potential exists in agriculture. [4]

14. The exploitation of that productive potential, by providing all the people in farming with economic-sized farms, obviously depends upon the availability of land Furthermore, there is another factor that requires a relatively low level of agricultural production. Low elasticities of demand indicate a situation where consumption of agricultural goods increases proportionately less than the increase in income. As income increases, a greater proportion of it is spent on non-agricultural

[1] *United Nations World Housing Survey: report of the Secretary-General*, p 127

[2] O Koenigsberger, M Safier and K Fallon, "Urban growth and planning in the developing countries of the Commonwealth", paper submitted to the United Nations Interregional Seminar on New Towns, London, 1973

[3] United Nations, *Interregional Seminar on New Towns*, New York, 1974, pp 6-7

[4] Lauchlin Currie, "Urbanization trends and policies" (ESA/HBP/AC 9/1), paper submitted to the Unit Nations I regional Seminar on New Towns, on,

products. Empirical studies demonstrate almost universally that, both in income and in price, elasticity of demand for agricultural products is very low, particularly in terms of calories or produce at the farm-gate.

15. Both the existence of productive potential in agriculture and the income elasticity of demand imply that, if high growth rates can be achieved in developing countries, an extraordinarily high rate of growth is unavoidable in places where goods with high elasticity of demand are produced—that is, in cities. Simultaneously, a very low rate of growth will be observed where agricultural goods are produced, i.e., in rural areas. In other words, equal rates of growth are incompatible with high over-all rates of growth. Stated in different terms, growth must be unequal in terms of both sectors and regions if high aggregate growth rates are desired. "This is the basic economic reason why urbanization is inextricably bound up with development." [5]

Structural change and urbanization

16. Economic growth for the benefit of all strata of society is only one reason why urbanization should be seen as an essential process of national development. There is evidence that cities are or may become the sites of increasing rates of social mobility and occupational change, of higher levels of education, of better diets, health, housing etc., and of a more favourable demographic structure, particularly declining birth rates. Lastly, cities become the arenas where a previously inaccessible population can effectively voice its desires and priorities.

17. The role that urbanization and urban development play in social and economic development, and the consequent importance of the provision of a fertile environment in which social equity and economic growth can prosper, is often underestimated. The human settlements system as a whole, and each of its components individually, must provide in an orchestrated manner for:

(*a*) Efficiency in economic growth and increased productivity;

(*b*) Social promotion, greater social equity, social mobility and social intercourse;

(*c*) Social satisfaction which, although dependent upon economic growth and social promotion, also depends upon the quality of the environment in biological, functional and aesthetic terms:

"Urbanization should also be considered in its role of diffusing cultural and technological knowledge; such knowledge is the true agent of change in the modernization of traditional rural settlements and their economic and social life. These positive aspects of urbanization must therefore be taken into account in the formulation of national urbanization policies." [6]

18. The extent to which the agricultural population will decline will vary, depending upon the diversification of the crop basis, export potential and rural landownership patterns. In any case, substantial reductions in the agricultural labour force (population) are to be expected. The questions then concern where and how well the increasing non-agricultural population would be accommodated.

Policies concerning urbanization

19. The Seminar's recommendations reflect a general consensus on the irreversibility of the urbanization process. In the opinion of the majority of participants, urbanization is an inevitable consequence of development and should be accepted as such. It is also an essential condition for economic and social development. However, there are countries where urbanization is still regarded as a negative process. Such views have the effect of delaying the adoption of appropriate policies. Too often, resources for urban development are being implicitly or explicitly restricted, with the expectation that, by favouring rural development, migration will be lessened and urban problems solved. The view that a forced slowing of migration from rural areas would solve the problems of urban development was contested as lacking realism. It was difficult to find any examples of this process taking place successfully, since it was not viable economically and was socially unjust.

20. For many years, urban growth policy and planning at national, regional and local levels continued to be based on piecemeal, largely negative or restrictive reactions to urban growth and concentrations, without succeeding in making any substantial impact on conditions and trends of urban expansion. Although government actions in areas such as mechanization of agriculture, promotion of large-scale imported technologies, concentration of investments in specific resource locations, infrastructure and public works investments, and credit and subsidy policies had direct bearing upon the distribution of the population and upon settlement sizes, urban development policies were largely formulated independently of governmental actions.

21. There cannot be a universally desirable pattern of population distribution between settlements of different sizes. Some degree of concentration or primacy may be unavoidable at the beginning of the process of industrialization. At the initial stages of development a certain degree of concentration is justifiable to maximize investments and speed up development, provided that profits gained from maximization are reinvested in the concentrated area and not diverted or expatriated. An excessive emphasis on dispersing migration at the earliest stages of development will require the dispersal of resources for infrastructure and services, which may not be in the direct interest of accelerated development.

22. An increasing number of the developing countries have adopted, or are beginning to formulate, national population distribution policies. These policies have derived, in part, from the increasingly pronounced

[5] *Ibid.*, p. 5.
[6] ESA/HBP/AC.9/48, p. 70.

nature of regional disparities, the acceleration and concentration of urban development, the dominance of "primate" cities, the stress syndrome in large cities, the failure to develop positive strategies on large-scale urban development and the desire to achieve the maximum output from various sectoral investments in particular areas or regions An important characteristic of such policies is the increasing importance placed upon *regionalization of national development plans* However, only a few examples are known of effective implementation of regional planning strategies

23 At first, most regional plans were conceived essentially as instruments to deal with problems of particular regions Regional planning has gradually become a planning strategy for regionalization of development plans, although the necessary organizational capability is still largely lacking in most countries The regional plans are not seen as substitutes for either local or national plans, but as a strategy to enhance the efficiency of both levels

24. Recognizing the importance and potentials of regional planning as an instrument for implementing national development goals, the Seminar recommended that development be undertaken on the basis of a comprehensive regional plan.

> "While in some countries it may not be feasible, at least for the time being, to undertake regional planning in its full operative sense as an instrument for investment decisions, the strategy to be adopted should certainly be based on comprehensive regional analysis This approach will make it possible to determine urban-rural interrelationships, to analyse the whole system of human settlement systems as the expression of social and economic development, matching the settlement of people with the creation of jobs and the provision of services. While economic *development clearly requires the maximum use of all* available resources, the development of regions where higher returns can be expected should initially receive priority, owing to technical limitations, capital investment shortages and lack of skilled personnel, both technical and managerial The notion of equity in geographical terms should be regarded as a long-term objective which might have to be achieved by stages." [7]

Underlying mechanisms relating to urbanization

The inherited patterns

25. The settlement pattern at any moment in history reflects the basic order of the prevailing social and economic activities in a country. The Seminar, recognizing that the distribution of population within a country is of the greatest importance for development, reaffirmed the impossibility of pin-pointing one pattern of population distribution as being the most desirable strategy to advocate for efficient and equitable development Among countries of the developing world, urbanization and industrialization are being experienced at various stages. Consequently, any effective policy of population distribution related to national development strategy should be formulated with a careful assessment of historical development patterns

26 As a result of historical structural dependencies, countries with colonial histories are facing special urbanization problems today A common characteristic of many of these countries is the existence of a poor urban network, urbanization having taken place almost exclusively in one city or in a few "primate" cities of colonial origin The location, function and development of such cities reflect the dependency between raw material-producing countries and outside colonial Powers Prior to independence, development investments initiated by foreign investors took place within the primate city environment with concentrated key facilities, infrastructure and job opportunities Later, after independence, these existing trends were reinforced, opening a single avenue for the influx of both needed investments and uncontrolled rural migration As pointed out by the Seminar, the interaction of economic development, technology, population growth, urbanization and the human condition is now globally accepted The improvement of health and sanitation measures have brought about dramatic changes in the life expectancy of the rural population More food is produced by fewer farmers cultivating more land, though not necessarily satisfying an increasing demand These factors, added to the desperate search for income, have generated a relentless stream of migrants that keeps densifying an already alarming population concentration in primate cities Yet, it is precisely this reality that should not be viewed as a negative process, but understood as a condition for, as well as the result of, development. As already mentioned, it is essential to recognize and accept the intrinsic interrelationships between urbanization, modernization of agriculture and over-all development as potential factors to help in formulating goals and policies, plans and programmes.

Development and settlement pattern

27. A network of settlements can be referred to as a "system of urban places" where mutual interdependencies exist among towns, cities and settlements of all kinds belonging to a single national entity. Each settlement within such a system hierarchy performs a function or several specific functions. National development may imply a change in the composition and aggregate level of these functions. The settlement system is not only a geographical phenomenon but, as underlined by Kazimierz Dziewonski, an historical phenomenon in time and space as well

28 The history of settlement of a given country can be analysed as it relates to the uncontrolled or determined evolution of a nation's development and wealth Indeed, the transformation of society can be

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[7] *Ibid.*, p. 73

observed through the evolution of its settlement pattern. Such a transformation takes place *in time*, whatever the underlying goals and strategies may be. This implies that at specific periods a coexistence of incoming and outgoing orders would always prevail. The transition from one socio-economic order to another requires a necessary and unavoidable adjustment in infrastructure. While changes in society tend to be assimilated rapidly and to supersede prevailing values, the infrastructural evolution takes place at a slower rate The new elements of technical, economic and social infrastructure are often just added on to existing ones.

29. Urban development cannot be dissociated from deliberate changes in national culture and social consciousness. Urbanization means also a specific way of life and a distinct culture. Therefore, urbanization and population distribution policies need to be geared to manipulating key variables in these changes, rather than to concentrating on ways to alleviate the undesirable effects of the forces underlying societal transformation.

30 As a society changes from a predominantly agrarian structure to a modern industrial one, certain typical differences emerge:

(*a*) The process begins with a self-sufficient subsistence economy with little investment and trade. The dominant settlement is the village or local urban-rural place with a population parallel to that of the natural resources, primarily land.

(*b*) With improvements in transport and trade, support and service activities are carried on for the village economy by a new and growing non-farming population The materials, the market and the labour are all furnished originally by the agricultural population There are universal similarities in the relationships between settlements appearing in the first stage and these "central places" with regard to their relative size and location,

(*c*) With further improvements in transportation technology and with increasing interregional trade, a region goes through a succession of agricultural land-use intensities;

(*d*) Mining and manufacturing activities gain increasing importance as a result of augmented productivity and emerging consumption patterns. Improvements in technology, due to industrialization and increasing national wealth, give rise to a number of large centres of specialized services and manufacturing.

> "The settlements systems in many developing countries have been initiated by exogenous forces in the period of colonial rule. They may therefore no longer correspond to the radically changed requirements and objectives of the country nor do they facilitate the achievement of development goals. In many cases, therefore, they must be consciously reshaped. Urbanization policies must be formulated, strategies selected and plans prepared and implemented to this effect." [8]

Size of settlements—determinants

31. One way to identify the settlement subsystem is to isolate urban places according to their size and the economic, social and institutional roles they play in the country's structure. Three types of spatially integrated settlements emerge. They are large urban agglomerations (metropolitan areas or conurbations), networks of regional centres and subcentres (also called subsystems of regional growth poles) and local urban-rural settlement complexes.

32. The growth of large urban agglomerations, especially in the early stages of economic development, is almost unavoidable. The economic advantages of concentration, together with rapid technological progress in the provision of communal services, lead to the creation of large concentrations of population and hence to the spatial explosion of large cities. This phenomenon has its manifestation in developing countries in the growth of primate cities, whose nature and evolution have already been analysed. The Seminar recognized the importance and role of metropolitan regions and primate cities. They are considered to be of paramount economic significance for developing countries, particularly for those experiencing the early stages of development. At such early stages of industrialization, the concentration of activities within one city could be justified from the point of view of economy of resources. Thus, there is a *direct relationship between the levels of development* and primacy; the less developed the country, the higher the degree of primacy.

33. Regional growth centres have several distinct functions. Large enough to be of major importance within their region, they act both as centres of progress and as administrative capitals. When a higher degree of equity becomes an essential objective of development, regional growth centres begin to play an important role by counterbalancing the one-sided growth of primate cities. Indeed, when the urgency of development combined with the scarcity of resources favours primate city development, built-in provisions should allow the planning process to divert resources and energies into the development of alternative growth centres. Failure to introduce at an appropriate time the necessary mechanisms to facilitate the growth of secondary cities or new growth poles would result in over-concentration and diseconomies of scale difficult to control later on.

34. The local urban-rural settlement complexes can be referred to as "central place" units at the lowest rank. Various localities within such complexes differ in function and specialization, which do not depend upon the cost of transportation but upon the social division of labour. Today, the size of these settlements' limits has grown considerably as a result of technological progress and modern transport. Similarly, they play a valuable role in the diffusion of technical knowledge in agriculture and in the spread of urban values and way of life. This aspect of urbanization policy cannot be ignored by planners and policy-makers for it may help channel the

[8] *Ibid.*, p. 76.

growth of small towns away from their current crisis and towards more integrated regional development.

35. The growth of centres of various levels in the settlement hierarchy depends upon various policy choices and upon their effective implementation Those choices affect not only the absolute size of the primate city, but the nature and extent of the primate city's dominance over the urban centre network. The effect of choice in key development decisions, such as in determining the type of investment and adaptation policies, has direct and important implications on the national settlement pattern It determines how the traditional urban centres will grow or will temporarily hold excess labour forces through product improvement or capital-saving policies. Similarly, the extent to which income gaps are created or levelled between the primate city and the rest of the country remains a powerful determinant of the scale of migration into large agglomerations

Evolution of the settlement system

36 Different types of resources, as pointed out earlier, exert various degrees of influence at different levels of socio-economic development In a predominantly agrarian society, the fertility of soil and climatic conditions largely determine the size of settlements and their distribution Another set of resources (minerals, energy sources, locational advantages etc) gains relative importance in a country in transition to the industrial stage of development Ernest Weissmann emphasized the fact that a settlement system shaped by the demands of one development stage need not be compatible with the requirements of subsequent stages of development [n] The exponential rate of technological change is likely to require flexibility in planned settlement patterns

37 The location of economic activities has largely been uncontrolled and has been based on the firms' individual choice These individual decisions have not posed grave problems so long as their environmental impact has been either insignificant or simply ignored, and they have carried the full responsibility for costs incurred to the community. However, "social overhead projects", an important locational determinant, has been increasingly financed by central Governments. It was noted that from one third to two thirds of the total national fixed capital was in construction and construction-related activities The scale of such allocations requires a careful assessment of the long-term interest and welfare of the community vis-à-vis the short term individual and corporate gains which are not necessarily based on payment of full costs.

38 The developing countries, the Seminar noted, had a unique advantage over the developed countries due to the fact that the basic population distribution patterns were in a state of flux, and that considerable opportunity existed for major changes to reflect the future needs

39 Great flexibility should be incorporated into the desired pattern of settlement networks due to rapid technological developments and social transformations Expressing a somewhat optimistic view, Weissmann pointed out that these developments would change the priorities in the developing countries as the basic necessities were provided Increased emphasis would be placed upon environmental qualities, amenities etc at advanced stages of the development process. The settlement system had to be devised in such a way as to reflect these changing priorities

FACTORS DISTORTING THE UNDERLYING MECHANISM

40 The previous section has presented a discussion of the underlying mechanisms that distribute the national population among the different sectors of the economy, and in settlements of varying sizes over the national territory The discussion concentrated on factors that the Seminar singled out as the primary determinant of a desired pattern of population distribution

41 Besides the potential conflicts between short-term and long-term requirements, other elements may distort the emergence and evolution of a desired pattern These elements are the municipal or government pricing policies, territorial distribution of political power and cumulative causation as it relates to terms of trade between different sectors of the population

Marginal costs versus average costs

42 In some countries, particularly in the developing world, such a large portion of the market becomes concentrated in one metropolitan area that smaller cities have difficulty growing and attracting economic activity In terms of the balance-sheet, each new industry or economic activity could justify its location in the single metropolitan area However, it is doubtful whether the expense in terms of social costs is properly considered

43 Thus far, no mechanism exists for assessing added marginal costs to the additional population Most of the more serious criticisms that can be made of life in large cities appear to focus around the intertwined problems of urban transport and the consequences of rising urban land values The first leads not only to a high absorption of resources that might better be used for more urgent purposes, but to high unmeasured "social" costs (time, inconvenience, irritation, noise and pollution etc). The latter leads not only to growing inequality, but to an intensification of the undesirable urban characteristics of extraordinarily high employment densities in the centre, spatial segregation by income classes and notable differences in styles of living. These disadvantages, consequences of a questionable urban spatial organization, are the result of the social malfunctioning, in terms of the criterion of ability to pay, of the price system and land-use patterns

[n] Ernest Weissmann Settlement systems and regional development in rapidly urbanizing countries" (ESA/HBP/AC 9/5), paper submitted to the United Nations Interregional Seminar on New Towns London, 1973

44. If traffic problems of large cities could be solved not by devoting ever-increasing resources to meeting traffic requirements but by reducing such requirements without loss of efficiency, and if the rise in land values resulting from growth could be retained and used by the community, the basic problems of large cities would in large part be solved. The solution, however, would entail such a sharp break with the trends that have been allowed to become established in developed countries that it probably would be unacceptable politically in such countries. Whether it would be equally unacceptable in developing countries is a moot question, since no real attempt has been made in such countries to implement the solutions.

Territorial distribution of power

45. In no country can the existing settlement system be explained, nor can policies related to desired future settlement systems be formulated, without explicit considerations of political realities in addition to those previously stated. Political factors play a key role in devising territorial administration, in determining the location of "public overhead investments", and in a large number of factors related to individual locational decisions such as uniform or minimum wage policies, pricing or regulating public utilities, control over location permits, taxation, subsidies etc. These factors do not show a universal pattern of impeding or facilitating the natural operation of underlying forces (in relation to regional disparities, population concentration, primacy etc.), but they have a significant impact upon the pattern of population distribution.

46. The developing countries are characterized by the concentration of political and administrative power in the primate cities. New institutional arrangements are necessary to enable the public to express their desires and priorities. It has been noted that the exclusion of the public from the planning process creates difficulties in formulating goals for development and in implementing development projects:

"The setting of clear goals is much easier in countries with a higher degree of social and economic homogeneity and political stability. Developing countries still in the process of sorting out their basic values are much more prone to political changes. A high degree of polarization, which characterizes societies in the developing world, will continue to create a degree of political instability until all sectors of society are better represented in the decision-making process." [10]

47. The lack of communication between the policy-makers and the general public, coupled with centralized power, prevents the full exploitation of local initiative in development efforts. There was a general consensus on the importance of regionalization of development plans as a means of encouraging public participation:

"Under conditions of political instability, policies, planning and indeed development will continue to be unsatisfactorily performed. Increased access to the decision-making by all members of the community is thus essential to provide the stability needed for planning and development which requires a sustained effort along a consistent path for relatively long periods." [11]

48. Economic growth is and will remain a primary target in developing countries. There is, however, a growing trend towards placing more and more importance upon equity in income distribution and emphasis on the well-being of the total population. Settlement policies must incorporate changes that would result in narrowing the income gap between the modern urban cores of big cities and the rest of the country, as well as in reducing the income gap between small minorities controlling substantial proportions of national wealth and the masses of the population. These changes will have profound impacts upon the relative importance of different geographical markets and upon the aggregate national demand for different goods and services as the income elasticities for most goods and services vary with income level.

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[10] *Ibid.*, p. 75.
[11] *Ibid.*, p. 76.

TECHNOLOGICAL TRANSFER, POPULATION AND ENVIRONMENT*

*Joseph J. Spengler***

1. This paper is an inquiry into aspects of the transfer of advanced technology—scientific, technical and social knowledge relating to production—from very advanced economies to less developed economies, together with the impact of this transfer upon the economic state of the population of the country receiving the technology Among the issues examined are (*a*) the links between demographic trends and types of technology, (*b*) the stage of economic development of the country and the type of technology required, (*c*) conditions affecting the transferability of various technologies, (*d*) the degree to which such transfer can augment income and ease population pressure, and (*e*) the degree to which environmental degradation and pollution may be prevented. It is assumed that as the demand for labour increases and employment rises, more workers master new skills and thus form additional human capital.

2 While the emphasis here is on the transfer of improved technology, it is taken for granted that technical progress, as an aggregate, includes not only importation of superior methods but their adaptation to the requirements of the country, along with indigenous development of needed technologies and improvement of all technologies in use It is assumed that usually, though not always, a new technology is developed or imported because a concrete need for it emerges, rather than because, as is true of most improvements, it is factor-saving as such It follows, if an improvement is made in response to a need, that attention can be directed to minimizing its adverse effects, if any, upon environment, employment and income distribution. [1]

INTERCOUNTRY DIFFERENCES

3 It is essential to keep in view the fact that developing countries both resemble and differ from one another, and hence in their response to the inflow of particular economy-transforming and income-augmenting technologies These countries are alike in that their infrastructure differs from that of Europe, whose economy responded to external assistance after 1948 and within three years increased its industrial output to 34 per cent above the 1940 level Developing countries differ from one another, however, in culture, political structure, resources and so on Accordingly, while the process of economic development, of which the transfer and adaptation of technology are parts, is universal in operation, it tends to differ by country, for it is a quasi-organic historical process, cumulative and self-reinforcing, with discoveries of new techniques arising out of social and cultural life [2]

4 If, for purposes of expositive convenience, one classifies as "developing" all countries with incomes of $600 or less *per capita*, one finds them differing greatly in size In 1970, of the 122 countries for which the *World Bank Atlas* provides information, 78 averaged less than $600 *per capita* Of these, 32 had less than 5 million inhabitants and 48 had less then 10 million inhabitants Countries with over 100 million population were China, India, Pakistan (including Bangladesh) and Indonesia, countries with roughly over 25 million population included Brazil, Burma, Egypt, Ethiopia, Iran, the Philippines, the Republic of Korea, Thailand and Turkey Within these 14 countries lived approximately 2 thousand million people, or about four fifths of the population situated in the developing areas of the world It should be mentioned that incomes in the area of Hong Kong and in Singapore, with populations of 4 million and 2 million respectively, currently average close to $1,000 *per capita*, because of a complex of conditions not present in most small countries

5 Many of these countries have similar demographic characteristics, among them being a high rate of natural increase (2 0-3 5 per cent per annum) with a relatively

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[1] Concerning the degree to which innovation is essentially a response to a "compelling' need rather than to rising factor costs, see Nathan Rosenberg, "The direction of technological change inducement mechanism and focusing devices", *Eco-* [illegible] vol XVIII (October [illegible] by Y Hayami and [illegible] eply, *ibid*, vol XXI [illegible] D Nordhaus, "Some [illegible] induced innovation", *Quarterly Journal of Economics*, vol LXXXVII (May 1973), pp 208-219

[2] Harry G Johnson, *Economic Policies Toward Less Developed Countries* (Washington, D C, Brookings Institution, 1967), especially chaps 2-3, Celso Furtado, *Obstacles to Development in Latin America* (Garden City, New York, Doubleday, 1970), Introduction, Anne P Carter, *Structural* [illegible] H B Chenery, "Growth and structural change", *Finance and Development*, vol VIII (September 1971), pp 16-72, Gustav Ranis, ed, *The Gap Between Poor a[illegible] Rich [illegible]ns* (New York, St Martin's Press, 1972)

high number of inhabitants under 15 years of age and a relatively low proportion of inhabitants of working age. As a result, potential productivity *per capita* is relatively low, the educational burden is relatively high and the capacity to form human capital is limited. Moreover, population tends to press on an often slowly expanding supply of food, and the annual influx of persons of working age presses upon a short supply of employment-producing capital and effective job-makers.

6. Developing countries also differ demographically. In 1960, density varied widely from 4 to 20 persons per square kilometre in much of Africa, Melanesia, South America and South-West Asia; from 49 to 65 persons per square kilometre in the Caribbean region, in South Asia and in much of East Asia; and to 80 persons per square kilometre in the remainder of East Asia. In the developing regions, about three fourths of the population occupied about three tenths of the area; while about one fourth of the population occupied seven tenths of the area. As a result, the degree of urbanization differed notably from one country or subregion to another. Differences in density and urbanization produce differences in urban patterns and in the man-land ratio, and hence in the availability of manpower for non-agricultural activities; the result is that countries differ in capacity to absorb technologies from abroad.

7. Developing countries differ also in their capacity to assimilate foreign technologies. Mention has been made of differences in the availability of manpower, differences which are often accentuated by shortages of natural resources, poor climate and terrain, unfavourable population distribution, imbalance between the structure of demand and the factor structure, unsatisfactory transport conditions and so on. [3] Many of these countries are handicapped by their small size, for only a small national market can be supplied by a small population of low-income receivers, particularly when this national market consists of small local markets prevented from expanding by unsatisfactory and expensive transport. Small market size also makes for less optimistic expectations and disposition to expand activities, and may restrict the capacity of *entrepreneurs* to develop plants of minimum-cost size. "The strong positive association between plant size and market size . . . high-lights the obstacles small nations face in achieving industrial efficiency internally, with implications for the potential contributions of trade integration". [4] Lastly, since development of an adequate local market for domestic manufactures is a preliminary for a country to become a successful exporter of these manufactures, the small size of its local market can handicap a small country with respect to its potential as an exporter.

8. Because countries differ in size and pattern of urbanization and because this pattern may condition the capacity of a country to adapt or generate technological improvements, and hence its growth potential, existing patterns may be in need of modification. On the one hand, output *per capita* usually is relatively high in large urban agglomerations. On the other hand, if there is only one large city in a small country, it may be described as being short of growth poles. Hence, there may be need in the short run for several cities, or for smaller ones, even though each is less conducive to growth *per capita* than a much larger one would be. Whether this is true depends upon whether the growth of aggregate and average income of a small country will be greater in the long run, given a few cities instead of one large agglomeration. [5]

Sources of growth

9. The following factors are responsible for low average income and output in developing countries: "(i) a low level of technical and organizing skill residing in the human factor of production; and (ii) a small quantity of the complementary factors of production, i.e., the total of land and capital". [6] This statement runs counter to the belief, still popular *circa* 1960, "that infusions of 'capital', if large enough, are alone sufficient to induce 'development' ", even in the absence of extensive cultural and institutional change, [7] and that international differences in capital and land *per capita* had largely accounted for differences in average output. Kuznets [8] puts the fraction of growth in *per capita* product that is imputable to the growth of capital at only between one quarter and one fifth. He further states that the remainder may be attributed to the growth of productivity. He adds, however, that the size of this balance is exaggerated, to the extent that it has not been corrected

[3] See A. J. Youngson, *Overhead Capital* (Edinburgh, University Press, 1966), chap. 4; Gunnar Myrdal, *Asian Drama: An Inquiry into the Poverty of Nations* (New York, Pantheon Press, 1968), vol. I, pp. 510-516, 678-681; John Weeks, "Employment, growth, and foreign domination in underdeveloped countries", *The Review of Radical Political Economics*, No. 1 (1972), pp. 112.

[4] F. M. Scherer, "The determinants of industrial plant sizes in six nations", *Review of Economics and Statistics*, May 1973, p. 144; see also S. Hirsch, "Anatomy of five export industries", *Israel Quarterly of Economics*, No. 2 (Spring 1972), pp. 68-80; H. B. Chenery and L. Taylor, *loc. cit.*; see also references in foot-note 20 below.

[5] See Koicha Mera, "On the urban agglomeration and economic efficiency", *Economic Development and Cultural Change*, vol. XXI (January 1973), pp. 209-224; and on unfavourable effects of "primacy", Carol Owen and R. A. Wilton, "Natural division and mobilization: a reinterpretation of primacy", *ibid.*, pp. 325-337.

[6] Jan Tinbergen, *Shaping the World Economy* (New York, Twentieth Century Fund, 1962), pp. 11-13; Angus Maddison, *Economic Growth in the West* (New York, Twentieth Century Fund, 1964); H. Kanamiri, "What makes Japan's economic growth rate high?", *Japanese Economic Studies*, vol. I (Fall 1972), pp. 31-48.

[7] Steven Enke, "Economists and development: rediscovering old truths", *Journal of Economic Literature*, vol. VII (December 1969), pp. 1128 and 1135.

[8] Simon Kuznets, *Economic Growth of Nations* (Cambridge, Mass., Harvard University Press, 1971), pp. 73 and 75-96, 305-308; E. J. Mishan, *The Costs of Economic Growth* (London, Staples, 1967); E. E. Hagen and Oli Hawrylyshyn, "Analysis of world income and growth, 1955-1965", *Economic Development and Cultural Change*, vol. XVIII, No. 1, part 2 (October 1969).

for non-conventional costs and for final products, which are, in fact, intermediate products. In some of the developing countries, however, what Kuznets calls "growth of productivity" is much smaller than in developed countries [9]

10. Estimates of the contributions of various sources of growth operative in a number of developed countries [10] have been subjected to criticism based, in part, on inadequacy of supporting data. [11] Even so, there is agreement with respect to the great importance of current and past progress in technology [12] Thus, Kuznets observes that "improvements not caused by any extra input of resources" (i e, of man-hours and material capital *per capita*) have been responsible for the high rate of growth *per capita* in the past century He states

> "These 'costless' improvements are connected with the tremendous increase in the stock of useful knowledge, much of it traceable to growth of science viewed as a social institution devoted to the production of new tested and hence potentially useful knowledge This inference is supported by the connections between the rapidly growing segments of modern developed economies in their succession over time and science-oriented-and-linked technological innovations." [13]

11 In view of the continuing contribution of technological progress to growth of average output, it is of concern to isolate, with reference to developing countries, the sources of improvement in technology, especially smaller cumulating sources of productive knowledge and to determine "what are the factors, particularly the economic factors, in the diffusion of existing technological knowledge", among them the profit motive [14] Diffusion within a developing country differs significantly, though not entirely, from diffusion within a developed country [15] For this and other reasons, among them the slowness with which economic transformation proceeds, some, but not all, economists agree with Malenbaum that in several developing countries "changes in supply of capital and labor alone nearly account for changes in output Technical progress is impeded, its gains are in some measure lost" [16]

12 Augmentation of output in developing countries other than those very richly endowed (e g, Kuwait, the Libyan Arab Republic and Saudi Arabia), depends immediately upon the introduction of modern technology appropriate to the factor structures of those countries, and ultimately upon the degree to which the labour force of those countries can be appropriately transformed so that their economies can be made hospitable to imported technology and complementary materials, and agents of production and transport can be made sufficiently available Successful transfer of technical procedures resembles a successful transplantation of new hybrid organisms much more closely than the transportation of a building from one country to another As A O Hirschman puts it

> "Implanting a project in an underdeveloped country implies (1) a decision to accept some *status quo* traits as temporarily unchangeable characteristics of the environment that will mold the project, and (2) a decision to consider others as subject to and ready for the kind of changes that are required for making a success of the project" [17]

Such implantation tends to be easier when population growth is not retarding the formation of capital and the creation of an environment favourable to the assimilation of appropriate technologies and projects from abroad

Impact of technological progress

13 Technological progress produces two types of effects, direct and indirect, which may be viewed from the standpoint of the individual or the economy

14 The health of inhabitants of developing countries may be improved directly by superior medical technology or indirectly by public health measures or increases in the availability of essential foods or in their richness in nutrients While increase in life expectancy

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[9] W Malenbaum, *Modern India's Economy* (Columbus, Ohio, Charles E Merrell, 1971), pp 117-123, Sherman Robinson, "Sources of growth in less developed countries a cross section study", *Quarterly Journal of Economics*, vol LXXXV (August 1971), pp 391-408

[10] For example, Edward F Denison, *Sources of Economic Growth in the United States* (New York Committee for Economic Development 1962) and *Why Growth Rates Differ Postwar Experience in Nine Western Countries* (Washington D C, The Brookings Institution, 1967), Colin Clark, *Conditions of Economic Progress* (London, Macmillan, 1960), pp 356-357 and *passim*

[11] See M Abramovitz "Economic growth in the United States" *American Economic Review*, vol LII (September 1962) pp 762-782, the critique by D W Jorgenson and Z G[illegible] *Curr*[illegible]

[12] [illegible] (Nev[illegible] E D[illegible] *Policy* (Washington, D C The Brookings Institution, 1967), R M Poats, *Technolo*[illegible] D C, The Brookings [illegible] *national Diffusion of* [illegible] Brookings Institution, [illegible]

[13] Simon Kuznets, *op cit* p 307

[14] See the review of Edwin Mansfield's *The Economics of Technological Change*, by K J Arrow, in *Science*, 9 May 1969 pp 699-700

[15] See Edwin Mansfield *op cit*, chap 4 Nathan Rosenberg, *Technology and American Economic Growth* (New York, Harper and Row, 1972), and Fritz Machlup *The Production and Distribution of Knowledge in the United States* (Princeton, New Jersey, Princeton University Press, 1962)

[16] Wilfred Malenbaum, *op cit* chap 4, pp 117-118 and references, S Robinson, *loc cit*, E E Hagen and O Hawrylyshyn, *loc. cit*, Allen C Kelley, J G Williamson and R J Cheetham "Biased technological progress and labor force growth in a dualistic economy", *Quarterly Journal of Economics*, vol LXXVI, August 1972, pp 426 447, D T Healey, "Development policy: new thinking about an interpretation", *Journal of Economic Literature*, vol X (September 1972), pp 770-771, R Prebisch *Change and Development Latin America's Great Task* (New York, Praeger, 1971)

[17] A O Hirschman *Development Projects Observed* (Washington, D C, The Brookings Institution, 1967), chap 4 especially p 131, also A O Hirschman, *The Strategy of Economic Development* (New Haven, Conn, Ya[illegible]versity Press 1958), pp 119 and 138

is the most striking direct result of the introduction of improved medical technology over the past 50 years, this result is also a joint indirect product of improved nutrition and diminished morbidity. A concomitant of improved nutrition and health is an increase in potential productive power, particularly in developing countries, where the nutrition levels of many persons are not only below optimum requirements but below minimum requirements and where the threat of food deficiencies has increased. [18] Improvements in health-care technology, which are being developed, should reinforce other sources of improved health if they are adapted to the needs of developing countries. [19] Of even greater importance is the development and introduction of superior, easier to use, methods of contraception.

15. Technological progress can increase the demand for contraception in the following ways: (*a*) by stimulating the employment of young women and thus increasing the alternative use-value of their time; (*b*) by facilitating the production of goods marketable at prices that are low in relation to average income, and thereby increasing alternatives to children; (*c*) by increasing the variety of goods and services and thereby increasing the cost of children in terms of goods and services.

16. Technological progress can increase both the variety of available goods and services and gross (or net) national product *per capita*. An increase in the variety of goods tends to increase the derived demand for labour and other inputs as well as to increase the ease with which production of these goods (especially new types for which demand is elastic) can be financed. Through technological advances some forms of mechanization and automation can be made conducive to an increase in employment, and hence in *per capita* output. For example, when labour surplus countries or regions are located near developed countries or regions, labour-intensive assembly operations can be established in these labour surplus regions, making them complementary to the more developed countries, and thereby reducing unemployment. Lastly, there is considerable scope for "work-restructuring" and adaptation of machines and labour to one another in ways that both improve productivity *per capita* and augment employment. Such restructuring can be carried out in one country or, given international firms serving a number of countries, in a number of countries treated jointly. In the longer run, relief from unemployment in developing countries depends upon their ability and freedom to participate in international trade, especially if they are small. [20]

17. Technological progress increases the output *per capita* by reducing some inputs per unit of output, thereby releasing agents of production from some uses and making them available for other uses. An example is the release of rural manpower as agricultural output per worker rises; this release that may be partially offset by an accompanying shift to urban centres and to the non-agricultural sector of functions formerly performed by agriculturalists. [21] If the elasticity of the direct and/or indirect substitution for other factors is high, then the ease of absorption of released manpower will be high. Even agriculture, a sector of the economy looked upon as overloaded with labour, may be enabled to absorb more labour, at least temporarily, although in the longer run the agricultural sector is a source of resources to other sectors. [22]

18. Economic development, a process of which technological progress is a part, permanently destroys a part of man's environment, as well as subjects it to pollution. This adverse impact is less pronounced in a developing country than in a developed country, but the countervailing power of the latter is greater, though not always capable of completely preventing or offsetting adverse effects. This question is discussed below.

19. Economic development also has tended to be accompanied by an increase in inequality at the early stages of the economic development of a country or large region. [23]

20. In time, as incomes rise, increased inequality is less tolerated and may lead to socio-economic instability. [24] Of course, if most of the inequality-increasing increments are invested in economic development, increase in inequality in consumption will be less pronounced, and the growth process will eventually result

[18] Nicholas Wade, "World food situation: pessimism comes back into vogue", *Science*, 17 August 1973, pp. 634-638. On nutrition, see W. T. Wilford, "Nutrition levels and economic growth: some empirical measures", *Journal of Economic Issues*, vol. VII (September 1973), pp. 437-458; Julian M. Simon and David M. Gardner, "World food needs and 'new proteins'", *Economic Development and Cultural Change*, vol. XVIII (July 1969), pp. 520-526; M. Selowsky and Lance Taylor, "The economics of malnourished children: an example of disinvestment in human capital", *ibid.*, vol. XXII, October 1973, pp. 17-30; M. Recheigl, ed., *Food, Nutrition and Health* (New York, S. Karger, 1973).

[19] C. D. Scott, "Health care delivery and advanced technology", *Science*, 29 June 1973, pp. 1339-1342.

[20] See J. F. van Houten, "Assembly industry in the Caribbean", *Finance and Development*, vol. X (June 1973), pp. 19-23; Jack Baranson, "Automated manufacturing techniques in developing economies", *ibid.*, vol. VIII (December 1971), pp. 10-17; J. J. Spengler, "Product-adding versus product-replacing innovations," *Kyklos*, vol. 10, fasc. 3 (1957), pp. 249-277; Gustav Ranis, *op. cit.*, chaps. 10-13. See also foot-note 39 and text to which it relates.

[21] David Pimentel and others, "Food production and the energy crisis", *Science*, 2 November 1973, p. 444.

[22] See R. J. Ward, "Absorbing more labor in LDC agriculture", *Economic Development and Cultural Change*, vol. XVII (January 1969), pp. 178-188; Folke Dovring, "Underemployment in traditional agriculture", *ibid.*, vol. XV, part 1 (January 1967), pp. 163-173; J. W. Mellor, "Accelerated growth in agricultural production and the intersectoral transfer of resources", *ibid.*, vol. XXII (October 1973), pp. 1-16; A. Bottomley, "Planning in an underutilization economy: the case of Ecuador", *Social and Economic Studies*, vol. XV (December 1966), pp. 305-313.

[23] Irving Kravis, "A world of unequal incomes", *Annals of the American Academy of Political Science*, vol. CCCIX (September 1973), pp. 61-80; Harry G. Johnson, "Some microeconomic reflections on income and wealth inequalities", *ibid.*, pp. 53-60; and P. S. Albin, "Poverty, education, and unbalanced growth", *Quarterly Journal of Economics*, vol. LXXXIV (February 1970), pp. 70-84.

[24] A. O. Hirschman and Michael Rothschild, "Changing tolerance for inequality in development", *Quarterly Journal of Economics*, vol. LXXXVII (November 1973), pp. 544-566.

in a decrease in income inequality. In general, whatever increases the substitutability of labour for other factors of production, and whatever increases the orientation of consumption towards labour and labour-embodying products, will also decrease inequality.

CONSTRAINTS ON TECHNOLOGICAL PROGRESS

21. Economic development activates latent constraints present in the physical and social environment of both developed and developing countries. Constraints present in developing countries are more difficult to surmount, however, because these countries lack the technology, instruments and disposable inputs needed to dissipate constraints. These constraints may have their origin in the size of the country or in population density,[25] in cultural factors or in reversals of forms of progress (e.g., escape of tsetse fly from controls, increase in vulnerability to disease of highly selected strains of cereal plants bred free of protective genes).

22. The restrictive conditions that limit the capacity of developing countries to absorb technology from abroad vary in terms of their permanence. Some are subject to correction in time (e.g., the skill structure of the labour force)[26] or through international exchange, whereas others may be permanent (e.g., energy-oriented modes of agriculture).[27] Among the conditions restricting capacity to absorb technologies, the following are illustrative:

(*a*) The small size of the market and hence limited access to economies of agglomeration and scale, originating in small population and area, together with a very small amount of mobilizable "savings" (e.g., in 1970, only three African and eight Asian countries and nine countries in the Western hemisphere had a gross national product of $6 thousand million or more). While constraints due to the small size of local markets may sometimes be eased through access to foreign markets, especially in high-income, developed countries, this access may be limited through import restrictions designed by developed countries to keep out products in which developing countries acquire a comparative advantage and an ability to market such products (e.g., labour-intensive products). It is possible, of course, as Myrdal notes,[28] that too much emphasis may be put upon market limitations, particularly should it prove possible to reduce optimum plant size;

(*b*) Unfavourable natural resource conditions, lack of transport facilities etc., which accentuate the limits of the markets confronting *entrepreneurs;*[29]

(*c*) Insufficiency of savings, especially those which facilitate investment in critical or strategic areas, and insufficiency of technical progress. For, as Kelley and Williamson show, factor augmentation and technical progress interact, and "increased savings rates foster industrialization-urbanization and thus a more rapid decline in population growth",[30]

(*d*) Shortage of skilled manpower and technical personnel to adapt and exploit technologies brought in from the outside, and lack of supervisory personnel to manage unskilled labour,[31]

(*e*) Incorrect pricing of capital, labour, foreign exchange and other inputs, due, in part, to imperfect input markets and in part to uneconomic policies. These conditions may give rise to inferior factor combinations and, hence, favour uneconomic policies bearing upon use of technology,[32]

(*f*) A high country-wide labour/capital ratio, together with (i) inability to increase capital quickly enough, as well as appropriately skilled and job-making personnel and other complements to labour, in order to absorb the growing population of working age, and (ii) failure of the pattern of consumption to change in ways that reduce both the capital/output ratio and the capital/labour ratio. However, as Kelley and his associates indicate,[33] an increase in savings may be consequent upon depression of wages by population growth,

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[25] On economic and political limits associated with the small size of a country, see Donald B. Keesing, "Small population as a political handicap to national development", *American Economic Review*, vol. LXI (December 1971), pp. 956-961. H. B. Chenery and L. Taylor, *loc. cit.*

[26] On the impact of [illegible] time, see D. B. Keesin[illegible] cients and the skill [illegible] *Journal of Internatior*[illegible] 452, and "Structural [illegible] changing industrial ar[illegible] 1950", *Journal of Ec*[illegible] 1969), pp. 716-738

[27] [illegible]

Less Developed Countries, *loc. cit.*, chaps. 2, 6, pp. 84-85, D. T. Healey, *loc. cit.*, pp. 785-792, D. B. Keesing, "Population and industrial development: some evidence from trade patterns", *American Economic Review*, vol. LVIII (June 1968), pp. 448-455

[29] See A. S. Youngson, *op. cit.*, chap. 4, G. Myrdal, *op. cit.* vol. I, pp. 510-516

[30] Allen C. Kelley and Jeffrey G. Williamson, "Sources of income growth methodology in low-income countries: a critique", *Quarterly Journal of Economics*, vol. LXXXVII (February 1973), pp. 138-147, especially p. 146. On saving, see R. F. Mikesell and J. E. Zinser, "The nature of the savings function in developing countries: a survey of the theoretical and empirical literature", *Journal of Economic Literature*, vol. XI (March 1973), pp. 1-26, S. Enke, *op. cit.*, pp. 1129-1130, D. T. Healey, *loc. cit.*, pp. 777-779, *World Economic Survey, 1969-1970* (United Nations publication, Sales No. E.71.II.C.1), chap. III, especially pp. 67-84

[31] Graham Jones, *The Role of Science and Technology in Developing Countries* (New York, Oxford University Press, 1971), pp. 105-109, 141-143, 212-214, G. Myrdal, *op. cit.* vol. I, pp. 694-696, J. Weeks, *loc. cit.*; R. M. Poats, *op. cit.*, p. 59, United Nations Educational, Scientific and Cultural Organization, *UNESCO Statistical Yearbook, 1971* (Paris, 1972), pp. 584 *ff.*, 592 *ff.*

[32] Joseph S. Berliner, "The economics of overtaking and surpassing", in Henry Rosovsky, ed., *Industrialization in Two Systems: Essays in Honor of Alexander Gerschenkron by a Group of His Students* (New York, John Wiley, 1966), pp. 159-185, D. T. Healey, *loc. cit.*, pp. 779-784, R. M. Poats, *op. cit.*, pp. 58-63; R. Hal Mason, "Some observations on choice of technology by multinational firms in developing countries", *Review of Economics and Statistics*, vol. LV (August 1973), pp. 349-355

[33] A. C. Kelley, J. G. Williamson and R. J. Cheetham, "Biased technological progress", *loc. cit.*, pp. 439-447; D. T. Healey, *loc. cit.*, pp. 765-772, *World Economic Survey, 1969-*

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(a) Incompatibility between the over-all capital/labour ratio and resource structure found in developing countries, on the one hand, and, on the other, the input structure called for by technology originating in developed countries and made available for transfer to developing countries.[34]

(b) Much of the land in developing countries destined for agriculture may not prove capable of the sort of intensive agriculture associated with heavy use of chemicals and water, or with high-yield cultivation under the aegis of the "green revolution";[35]

(c) The presence of a relatively large number of unemployed can make labour-saving technology less attractive unless it is foreseen that in the longer run, technological progress will increase the aggregate demand for labour.

(d) Unless they are selected very carefully, imports of knowledge and techniques from developed countries tend to be too capital-intensive, and hence too expensive for economical use in developing countries under a variety of conditions.[36]

(e) At the initial stage of the transformation of a traditional economy into one absorbing new technology, it is not so much the acquisition of new technical competencies that presents problems as it is the mastery of competencies relating to the co-ordination and control of activities—especially in manufacturing, as compared with agriculture—and the assurance of full and continuous operations.[37]

(f) There may be too little expenditure in developing countries for research and development, i.e., for the development and absorption of new technology and the assessment of its potential environmental impact. There may also be relatively ineffective use of resources devoted to these matters, in part because intersectoral communication is inadequate and too little attention is paid to economic and related problems.[38]

23. Case studies of developing countries that have absorbed newer technology and overcome capital shortage may be contrasted with case studies of developing countries that have not been similarly successful. Such comparisons are much more revealing than are international comparisons of the supposed effects of differences in the absolute and relative amounts of technical personnel, and investment in research and development: they can clarify the ways in which policies can be successfully carried out. Case studies of historical Japan and the present-day Republic of Korea suggest that flexible operational policies can enable countries to overcome some of the unfavourable effects of over-all high labour capital ratios. Ranis finds, "except for continuous process industries and industries very close to the crude raw material processing stage, there in fact exists a very substantial potential for factor proportions variability" (e.g., labour-capital substitution). Not only can capital be fully used, but there is great scope for an output-increasing learning effect, as well as for changes in output mix, when a developing country is trade-oriented.[39] Of great importance, of course, is the introduction of technologies similar to those developed in these countries.

Alternatives

24. Every developing country embodies a set of conditions which, though modifiable in time, restrict its available options and the choice of means suited to the absorption of technologies from outside, the deceleration of population growth and the augmentation of average output. A major limit is the relatively high level of unemployment found in many developing countries, together with the rapid growth of the population of working age. Therefore, capacity to absorb new technology is conditioned by its compatibility with a low over-all ratio of capital to labour and output, though economic modernization and transformation can extend these limits backwards.[40] Alternative courses of action may be examined under two topics, modes and factor combinations.

1970, pp. 125-135, G. Myrdal, *op. cit.*, vol. III, pp. 2047-2049, 2203-2021 and 2044-2047, J. Weeks, *loc. cit.*, R. M. Poats, *op. cit.*, pp. 51-57.

[34] G. Jones, *op. cit.*, pp. 212-216, 103-114, 126-131; G. Myrdal, *op. cit.*, vol. I, pp. 693-694, 697-698, vol. II, pp. 1168-1172, Organisation for Economic Co-operation and Development, Science and Development, *First Teams Project Evaluation Conference* (Paris, 1968), chaps. 5-6.

[35] G. Myrdal, *op. cit.*, vol. II, pp. 1261-1294, A. Gomez-Pompa, C. Vazquez-Yanes and S. Guevara, "The tropical rain forest, a non-renewable resource", *Science*, 1 September 1972, pp. 762-770; chapters by H. Sioli and F. R. Fosberg, in Betty J. Jeggers, E. S. Ayansu and W. D. Duckworth, eds., *Tropical Forest Ecosystems in Africa and South America* (Washington, D. C., Smithsonian Institution Press, 1973); E. P. Odum, "The strategy of ecosystem development", *Science*, 18 April 1969, pp. 262-270. United States of America, President's Science Advisory Committee, *The World Food Problem* (Washington, D.C., Government Printing Office, 1967); R. M. Poats, *op. cit.*, chaps. 2, 6; D. H. Janzen, "Tropical agroecosystems", *Science*, 21 December 1973, pp. 1212-1219; Colin W. Clark, "The economics of overexploitation," *Science*, 11 August 1973, pp. 630-634; D. Pimentel and others, *loc. cit.*

[36] See M. J. Sharpston, "Health and development", *Journal of Development Studies*, vol. IX (April 1973), pp. 458-459; Charles Cooper, "Science, technology and production in the underdeveloped countries: an introduction", *ibid.* (October 1972), pp. 1-18; John Robert, "Engineering consultancy, industrialization and development", *ibid.*, vol. IX (October 1972), pp. 39-62; *The Development of Management Consultancy*. (United Nations publication, Sales No. E.72.II.B.30).

[37] See Peter Kilby, "Farm and factory: a comparison of the skill requirement for the transfer of technology", *Journal of Development Studies*, vol. IX (October 1972), pp. 63-70.

[38] According to a report by the Organisation for Economic Co-operation and Development (OECD), five small Western European countries have made better use of their scientific resources than have the three largest countries. *The Research System*, vol. II (Paris, 1973).

[39] G. Ranis, *op. cit.*, pp. xviii-xxi; see also M. S. Baram, "Technology assessment and social control", *Science*, 4 May, 1973, pp. 465-473; W. T. Knox, "Systems for technological information transfer", *Science*, 1 August, 1973, pp. 415-419; Organisation for Economic Co-operation and Development, Evaluation Conference, *op. cit.* Data are given in United Nations Educational, Scientific and Cultural Organization, *UNESCO Statistical Yearbook, 1971*. See also foot-note 20 and text to which it relates.

[40] Such drive did not characterize nineteenth-century tropical export trade. N. H. Leff, "Tropical trade and development in the nineteenth century: the Brazilian experience", *Journal of Political Economy*, vol. LXXXI, (May-June 1973), pp. 678-96.

Alternative modes

25. There are three principal modes whereby new technologies may be brought in from abroad and assimilated: (1) international corporations, (2) import replacement, and (3) local businessmen interested in introducing superior methods in general

26. International corporations along with small foreign investors,[41] may seek to exploit local raw materials (e g , oil and other minerals) or to develop manufacturing or service-oriented activities and achieve economies of scale In the one case, they find foreign outlets for mineral products in a raw or, if feasible, in a more refined or manufactured state, in the other case, they develop regional chains of outlets, together with local suppliers, and thereby exploit economies of scale in market-oriented services (e g , retail merchandising) and possibly smaller scale manufacture. The international corporation is a very effective instrument because it brings in skilled personnel, together with the scarcest components; the corporation is also able to find external markets and to train citizens of the host country The chief concern of the host country is to derive as great a benefit as possible from the activities of the foreign corporation, in terms of revenue, share in profits, training of personnel and inflow of modern technology

27. With respect to the second mode, until recently, import substitution made possible by tariff protection was viewed as an easy way to initiate industrialization, set up infrastructure and facilitate the introduction of newer technology. In the past, of course, import substitution has been stimulated when war has cut off imports and when developing countries have had their importing power reduced by the collapse of primary-product prices. However, with the increasing complexity and capital-intensity of imported technology, import substitution has encountered constraints, especially in small countries with small markets It has given rise to costs, direct and indirect, some of which are easily foreseeable while others become apparent only gradually; and it has, on occasion, led to the consumption of capital-intensive consumer goods. Moreover, even when successful, import substitution has been of limited effectiveness when it has run counter to forms of specialization that could result in large volume production for sale at home and abroad. It is most effective, of course, when the size of a country and the condition of its transport system assure a sufficiently large local market.[42]

28 As concerns the third mode, most of the industrial activities of a developing country need to evolve in keeping with its resource and factor structures and the want-patterns of its inhabitants While the course of this evolution will depend in some measure upon the combined effects of technical progress and savings, it should make much more employment available than would dependence upon import substitution and multinational corporations The growth of the bicycle industry in India affords a good example. John Wall finds that a domestically oriented industry can progress and produce favourable spillover effects [43]

29 Given an evolutionary approach, three sources of resource waste can be avoided. First, the tendency to use instruments and/or individuals embodying excessive amounts of investment in physical and/or human capital can be minimized [44] Secondly, full use is more likely to be made of inputs of capital and technology. Thirdly, technology, education and training of individuals and input combinations can be kept flexible and, hence, closely adjusted to the current and the prospective structures of factor prices and the state of labour and capital supply [45] Such flexibility should make easier the saving of resources devoted to less productive *élite* education and the use of these resources for training potential members of the labour force Above all, such flexibility would strengthen the forces making for reduction of unemployment, underemployment and disguised unemployment.

30 With the growth process dominated by this third mode, tastes would be more likely to develop in keeping with the mode of production than with the much more capital-oriented methods of production dominant in developed countries; as a result, the disparity between incomes and wants would not become intolerably wide, as is likely when tastes such as those found in developed countries become quite prevalent and resource-wasting élitism, often of colonial vintage, is perpetuated. Moreover, Myrdal finds,[46] there is less risk of failure in a

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[41] G Jones, *op cit*, pp 109-111, G Ranis, ed, *op cit*, chaps 12-14, R M Poats, *op cit*, pp 55 and 64, R Hellmann, *The Challenge to U S Dominance of the International Corporation* trans by Peter Ruof (New York, Dunellen Co, 1971), L R Brown, *World Without Borders* (New York, Random House, 1972), chap 11 Disadvantages associated with such corporations are stressed by Stephen Hymer, "The

Developed Countries, *op cit*, pp 56-59 and 71-74, chap 6, A O Hirschman, "The political economy of import substi-

[43] John Wall, "External economies and localization in small scale industry a case study of the bicycle manufacturing industry in Ludhiana District, India", unpublished doctoral dissertation, Duke University, Durham, N C, 1973

[44] Concerning this tendency, see papers by Charles Cooper, Amilcar Herrera John Roberts, Francis Stewart and Clive Bell in the special issue on "Science and technology in development", *Journal of Development Studies*, vol IX (October, 1972), pp 1-62 and 99-160

[45] See E Costa, "Maximizing employment in labor-intensive development programs", *International Labor Review*, vol CVIII (November 1973), pp 371-394 On the comparative contribution of capital, education and progress, see E E Hagen and O Hawrylyshyn, *loc cit*, pp 93-94

modern context than that which characterized the impact of Europe on Asia before the Second World War. There would also be considerable scope for small but dispersable and cumulative improvements, and for support of efforts to miniaturize optimum plant size. [47] Lastly, this approach should assure the agricultural sector of its growing requirement of goods and services and the expanding agricultural labour force (swelled by the land-saving and labour-absorbing "green revolution") of its non-agricultural needs; it might even make for greater agricultural variety and thus provide some protection against risks associated with single-character uniformity, which makes a plant genetically vulnerable to crop devastation. [48]

Alternative technologies

31. Under static conditions, and with minimal emphasis upon futurity, the preferred mode of production is that most in keeping with the resource structure of a country. With but one technology at hand, the choice is simple. For the most economical combination of factors or inputs is that at which each input is used as nearly as possible in such circumstances that its marginal contribution to the finished product coincides with the supply price of this input. Even then, employment may not be maximized if aggregate income is unevenly distributed and, as a result, consumption is unduly capital-oriented.

32. Under dynamic conditions, a wider range of technological alternatives could be available. Among the possible attributes of technologies, a few may be mentioned: (*a*) They may differ in terms of the ease with which they may be absorbed into a country; (*b*) They may differ in their favourable and unfavourable spillover (e.g., discharge of pollutants) and in the cumulativeness of these effects; (*c*) Some technologies are more likely than others to make for reduction of fertility, and hence to be preferable over the longer run because the combined effect of fertility reduction and output augmentation is preferable to effects produced by technologies with less contribution to fertility reduction. For example, a technology that eases the entry of women into the labour force, fosters urbanization or makes certain products attainable may discourage fertility; [49] (*d*) Some relate to the near future, whereas others are relevant only to the more distant future; (*e*) Technologies differ also with respect to the inputs whose relative use they increase or decrease.

33. As a rule, the most important choice confronting a developing country is that between a capital-absorbing, labour-displacing technique and its opposite, a capital-economizing, labour-oriented technique. Capital-oriented techniques are economically justified for two reasons: that they embody much know-how and hence make for high output per worker, and they thus make possible a high rate of savings and thereby facilitate growth and the transformation of the economy. [50] Use of these techniques tends to limit employment and access to "learning" effects, except in so far as more and shorter period shifts of labour, and hence more workers, can be used with these techniques. Capital-oriented techniques make for unemployment by accentuating other shortages of capital encountered in developing countries—e.g., shortages occasioned by abnormally low prices for capital and by consumption patterns unduly oriented to capital-intensive products—and by absorbing higher grades of personnel complementary to unskilled labour, made less employable by a shortage of supervisory and other job-making personnel.

34. Healey's survey of development-policy literature suggests that a number of conditions make for capital-intensive modes of production when, given existing factor structures, less capital-intensive modes would make for less waste of capital and less unemployment, the volume of which is sustained and increased by high rates of population growth. Capital-intensivity has been accentuated by the importation of technology and equipment from modern labour-short, capital-long countries, as well as by the importation of ideas and policies stressing government planning and exchange control, heavy industry, import substitution and quasi-autarky, along with neglect of agriculture, as well as of growing inequality and unemployment. This capital-intensive policy is now coming to be doubted, as "signs of failure" become more obvious. [51] It is possible, therefore, that greater consideration will now be given to the fuller and more conservative use of scarce resources (e.g., capital), as well as to control of pollution and environmental degradation.

35. Several conclusions follow from this discussion of technological alternatives. First, more emphasis must be put on: control of fertility, given the increase of current unemployment as a result of past high fertility; labour-intensive modes of production, since some capital-intensive activity is unavoidable and elimination of unemployment is difficult, given a high labour-force growth rate and misuse of capital; production patterns oriented to the supply of products priced nearly within the reach of the mass of the working population, and hence conducive to control of family size. Secondly, institutions and organizations engaged in facilitating the

[47] See, for example, various issues of *Small Industry Bulletin for Asia and the Far East*, and *Industrialization and Productivity Bulletin* (United Nations publications).

[48] National Academy of Sciences, *Genetic Vulnerability of Major Crops* (Washington, D.C., 1972); Lester R. Brown, *Increasing World Food Output* (Washington, D.C., United States Department of Agriculture, 1965), pp. 51-61; *idem*, *Seeds of Change: The Green Revolution and Development in the Seventies* (New York, Praeger, 1970); Tom Alexander, "Ominous changes in the world's weather", *Fortune*, vol. LXXXIX (February 1974), pp. 90*ff*., in particular p. 152.

[49] J. N. Morgan, B. Strümpel and E. Zahn, eds., *Human Behavior in Economic Affairs* (San Francisco, Jossey-Bass, Inc., 1972), chaps. 12-13.

[50] See A. K. Sen, *Choice of Techniques* (Oxford, Blackwell, 1960), chaps. 2, 8; A. C. Kelley, J. G. Williamson and R. J. Cheetham, "Biased technological progress, . . .", *loc. cit.*; Frances Stewart, "Choice of technique in developing countries", *Journal of Development Studies*, vol. IX (October 1972), pp. 99-122.

[51] D. T. Healey, *loc. cit.*, pp. 772-795; S. Enke, *loc. cit.*

transfer of technology to a developing country must take into account its resource structure, its unemployment situation and its risk of environmental degradation and pollution from particular technologies [52] Thirdly, adaptation of the experience of the Republic of Korea to less densely peopled countries is indicated

POPULATION, TECHNOLOGY AND ENVIRONMENTAL QUALITY

36 Forms of environmental degradation may be variously categorized. For example, short-lived and essentially non-cumulative pollutants must be distinguished from those with longer life. The former category includes products of combustion (carbon monoxide, carbon dioxide, oxides of nitrogen, oxides of sulphur, hydrocarbons, and particulates) and some water pollutants. Radiation, pesticides, heavy metals and chemicals are in the latter category. These forms may also be classified in terms of their causes (*a*) exploitation of the surface and subsurface of the earth in search of sources of energy (fossil fuels and fissionable material), of minerals and raw materials, and of sources of the products of agriculture, sea and forest under non-sustainable conditions; (*b*) accumulation and maldistribution of unused and non-utilizable residuals generated in the course of consumption or production. Forms may also be classified according to the degree to which they are connected with modern technology, rather than with population growth, as such, and hence need to be controlled through changes in technology.

37 The ultimate source of residuals, pollutants etc is human consumption, since the demand both for exploitation of the environment and for production as such is a derived demand originating in the pattern of a population's wants as effectively expressed by the volume and character of its aggregate consumption While this aggregate increases, *ceteris paribus*, as the number of consumers (i e, population) and average consumption increase, its contribution to the deterioration of the environment will rise or fall with changes in the methods of production or in the composition of aggregate consumption.

38 Given sufficient increase in population, or average consumption, or both, in a given region, deterioration of environmental quality will set in Attempts will made to raise the level of cultivation and rate of exploitation of reproducible organic life above sustainable carrying capacities, often with the result that both aggregate output and capacity decline. [53] These attempts are likely to be accompanied by an increase in pollutants in the form of persistent insecticides and herbicides utilized to countervail threats to the enlarged volume of plant life. Exploitation of mineral and related resources is extended into increasingly less resource-rich regions, with the result that more and more terrain has to be torn up in order to yield a given amount of resources; [54] in the longer run, the economically realizable output itself shrinks Meanwhile, the aggregate flow of residuals increases, along with the average cost of disposing of them Their adverse effects upon human health also increase. Some forms of pollution (rising acidity in rain) may also reduce local food-producing potential

39 Environmental degradation is not a localized phenomenon, but one that might occur at points quite removed from its points of origin Such high-income countries as Japan and the United States of America import large and increasing amounts of portable natural resources from other countries, where the extraction of these resources may shrink the long-run economic base, as well as disturb or degrade the environment. Pollutants originating in some countries may be carried by air or water to other countries

40 Although both population growth and income growth tend to foster environmental degradation, their comparative impact is variable If a 1 per cent rate of growth of average income y had the same effect as a 1 per cent increase in population p, one could set environmental pressure P equal to py, and the rate of growth P' of P approximately equal to $p' + y'$, where p' denoted the rate of growth of p, and y' that of y However, the impact of y is conditioned by c, the composition of consumption, and by t, current technology A value of 1 0 can be assigned to c and t, respectively, as of a base year, or, for purposes of international comparison, as of a base country Then the relative values of the c and t of a country can rise above 1.0 or fall below 1 0 when intertemporal, international or interregional comparisons are made If one writes $P = pcty$, and let P' approximate $p' + y'ct$, the effect of an increase in y relative to increase in p depends not only upon the comparative magnitude of the two rates, p' and y', but also upon whether changes in c and t intensify or diminish the effect of an increase in y Some students put major responsibility for increase in P and environmental degradation upon increases in y and the associated impact of change in ct, [55] whereas others also stress the independent influence of population growth and its impact through growth of the output of products, demand for which is dominated by population growth. [56]

41. While a study done by Resources for the Future does not deal with all sources of pollution, [57] it does

[52] R M Poats, *op cit*, pp 66-83, T J Allen and others, "The international technological gatekeeper", *Technology Review*, March 1971, pp 37 43.

[53] See foot note 35 above

[54] See, for example, National Academy of Sciences, *Resources and Man* (San Francisco, Calif, W H Freeman, 1969), in particular, chap 6

[55] [illegible]

[56] Paul R Ehrlich and John P Holdren, "Impact of population growth", in Ronald G Ridker, *op. cit*, pp 365-377.

[57] On these sources, see *ECE Symposium on Problems Relating to Environment* (United Nations publication, Sales No E 71 II E 6)

disclose connexions between population growth and environmental degradation, together with estimates of current capacity to control degradation. This study was based on input-output models and alternative assumptions. Population was assumed to grow on the basis of either two or three children per woman, while *per capita* income was assumed to grow at a high or a low rate. With respect to control of pollution it was assumed that current methods would continue, or that either a non-active or an active pollution-abatement policy would be pursued. Underlying the resulting estimates of the generation of pollutants were estimates of the use of natural resources, raw materials, soil nutrients, pest controls etc. [58]

42. The estimates of major concern for the present study are:

(*a*) Increase in average income was responsible for most of the increase in the generation and emission of pollutants;

(*b*) Even assuming great increases in population and income, an active abatement policy could reduce pollutants to a small fraction of the 1970 output with regard to particulates, hydrocarbons, oxides of nitrogen, biological oxygen required and suspended solids. Not much could be done with dissolved solids, however, the absolute amount of which would therefore increase greatly above the 1970 level. The cost of an active abatement policy would run about 2 per cent of the gross national product over the period from 1975 to 2000;

(*c*) Over a period of from 30 to 50 years "a direct attack on pollution dominates over a reduction in population or a reduction in economic growth as a strategy for obtaining a clean environment, at least in so far as the particular set of pollutants we have looked at are concerned". However, a slowdown in population and economic growth reduces the need for the "application of solutions the secondary consequences of which we may not like". In the long run, moreover, "reductions in population growth are probably more important than reductions in economic growth". [59] Even then, exhaustion of such resources as hydrocarbon fuels will make necessary changes in the sources and location of energy supplies.

43. Other pollution strategies are indicated. Taxes can be used to change the composition of consumption and production (by reducing private passenger motor-car size and shunting more travel to public transport). Direct controls can be imposed on the output of products with high-pollution emission coefficients. Zoning can be used to separate some pollution-generating economic activities from population centres. To these may be added implications of the finding that the incidence and distribution of pollutants are positively associated with city size and density within urban areas, [60] since it follows that, within limits, improvement in population distribution can reduce the incidence of pollutants and the health and other costs associated therewith. Only careful, long-run planning can minimize the incidence both of shrinking raw material supplies and of pollutants.

44. Modernization of agriculture has greatly increased the pollution potential of agriculture. It has concentrated livestock waste and thus generated a variety of pollutants, some of which enter ground water. Furthermore, fertilizer, which has replaced livestock waste as the major plant nutrient, can become an important source of pollution, as can herbicides and pesticides. While land is a partial substitute for plant nutrients and pesticides, this substitute is not available to land-short countries. Moreover, discontinuance of the use of herbicides and of pesticides, such as DDT, raises insect-control costs, reduces crop yields and increases the incidence of insect-borne disease. [61] Whence acceptable policies involve exchanges between some disadvantages and others.

Income levels and pollution control

45. Augmentation of average income in developing countries depends upon growth of capital *per capita*, steady decline in the rate of population growth to or near the zero level and appropriate technological progress, particularly technological progress that is conducive to employment, urbanization and the acquisition of tastes favourable to family planning and decline in fertility. Both technological progress and increase in capital *per capita* tend to foster increase in environmental degradation and pollution, though not at first to a marked degree; for, given the low levels of income and technology in use in most developing countries, current levels of pollution are not high nor immediately susceptible to high incremental growth.

46. Demands in developing countries for control of pollution and the preservation of environmental quality are weak. First, as has been mentioned, pollution is strongly associated with modernization, a process with which developing countries have had little experience. Secondly, not only is the supply of pollutants low, but the demand for control of pollution is weak. The demand for control of pollution emerges as wants in the upper levels of the hierarchy of wants grow in relative importance and as rising incomes make more tolerable expenses associated with reduction of pollution through abatement programmes. Even so, with incomes as low as they are in developing countries and with the marginal utility of income as high as it is, the exchange between increments of income and decrements of pollution will not be very favourable to the control of pollution.

47. Several general principles are therefore in order. Initial emphasis must be put upon technological changes that adversely affect average income. Secondly, the costs of pollution control must be low absolutely in relation to incomes. Thirdly, it is desirable that when a tech-

[58] Ronald G. Ridker, "The economy, resource requirements, and pollution levels", in Ronald G. Ridker, *op. cit.*, pp. 35-57.
[59] *Ibid.*, pp. 50 and 56.
[60] *Ibid.*, chap. 9.

[61] *Ibid.*, pp. 195-201.

nology is being developed, attention be given to incorporating pollution controls in the technological instruments under consideration. Fourthly, while insensitivity to pollution control may be pronounced in a low-income country, there usually are sensitive points and areas which may function as bases for the initiation and spread of controls Fifthly, because developing countries cannot bear heavy control costs and because the utility of particular sources of pollution (e g , DDT) is very high in these countries, what is treated as an important pollutant in a developed country may not be so treated in a developing country Anti-pollution strategy, therefore, calls for the selection of sensitive areas (for example, such areas as agriculture and fisheries, in which pollutants can retard growth of output) and the gradual development of sensitivity to environmental degradation in general

48 Four sets of industrial activities can play a major role in the introduction of pollution-abatement methods into developing countries

(1) International corporations can do this conveniently in conjunction with the industrial activities they establish, since they will have been forced to take action in their countries of origin or operation,

(2) Developed countries operating through international agencies or other channels can assist developing countries in avoiding the pollution that accompanies modernization of agriculture and in developing biological controls for pests;

(3) As motor vehicles constitute a major source of pollution, developing countries can insist upon importing, or developing locally, only relatively pollution-free vehicles (e g , small motor-cars), for importers have access to a large number of foreign sources;

(4) As the production of energy, the most critical element in modern economies, will be increasingly subject to pollution-abatement rules in developed countries, these controls can be adapted to developing countries as required, on health and related grounds.

49 It is desirable that the health and other advantages of pollution control be made evident to the inhabitants of the controlling country, together with the adverse effects of pollutants upon the quality of the water supply and its impact on food sources (e g , fisheries) It is desirable also that a country be aware of its possible dependency, both of the access of its exporters to foreign markets and of the state of its international relations, upon the degree to which its generation of pollutants is limited.

50 Before turning to the establishment and enforcement of rules designed to curb pollution, attention must be called to several precautions. First, given their cost, controls should not be introduced unless careful inquiry indicates that they are needed, that the benefits clearly outweigh the costs and that benefits accrue largely to those bearing these costs Secondly, given the shortage of competent bureaucratic personnel, it would be economical to fall back on bureaucratic controls only if satisfactory alternative methods are not available. Thirdly, the sequence of proposed controls must be considered, since there may result only a change in form of pollution (as when air pollution is converted into water pollution or clean-air requirements make for increase in fuel consumption, and, hence, in the total volume of motor exhaust fumes to be removed) or, as a result of current action, much more serious problems will be averted in future Fourthly, the establishment of satisfactory environmental indexes will increase the likelihood that action will be taken only when really indicated Fifthly, inquiry into the values underlying a population's attitudes towards nature and the quality of life and man's environment may reveal the way in which support for desirable pollution controls may be mobilized

51 Four adaptive mechanisms, functioning individually or jointly, are available for control of the environmental degradation and the rate of consumption of utilizable components of the physical environment. the price mechanism, change in tastes, technological change, institutional change [62] The most important adaptive mechanism is the first—i e , change in price structure, due to the incidence of taxes, cost changes and demand shifts Of much less importance is change in tastes, a condition subject to many influences, including response to prices and to changes in the exchange between current and future generations Technological change can play an important part, as can institutional change (e g , prohibitions, constraints)

52 As a rule, penalties, rewards and prohibitions will be employed to hold down forms of consumption and the generation and emission of pollutants Taxation of polluters is, of course, cheaper and more effective than are rewards to non-polluters, although financial assistance may be indicated to developers of methods that reduce the generation, emission or incidence of pollutants Since patterns of population distribution in many developing countries are still evolving, this evolving pattern should be oriented in pollution-averting directions. What may also be required is the encouragement of housing and other forms of construction that are less dependent upon air-conditioning (as are Western structures) and hence are dependent upon possible pollution-generating power production

53. Increasing the welfare index of most, if not all, developing countries calls for increases in income and savings *per capita*, the introduction and adaptation of suitable technology already developed in other countries, in addition to locally developed cost-saving techniques, and control of population, since, at a minimum, the populations of developing countries seem destined to increase by at least 150-200 per cent above 1970 levels Because of the critical importance of technological progress, it is desirable that there be established in most

[62] Michael Common and David Pearce, "Adaptive mechanisms, growth, and the environment: the case tural resources", *Canadian Journal of E* s v ugust 1973), pp 289-300

developing countries a small agency designed to work with locally situated industry, with local development institutions and with international and foreign agencies dealing with the origin, development and transfer of modern technology. Such an agency can serve as a clearing-house for old and new information, as an intermediary for local industry in need of technological help from externally situated sources, as a sensor of emerging environmental problems, and as an assembler and mobilizer of information, experience and methods relating to pollution control, together with the costs and benefits of such control. While the agency may also assemble and analyse information bearing upon the response of family planning to technological changes that affect the flow and composition of final product, it should not be directly involved in family planning and public health programmes. Its primary focus must remain facilitation of technological progress and the avoidance of economically avertable environmental deterioration. [63]

THE ROLE OF INCENTIVE

54. Even though a decision-maker's options are shaped and conditioned by his socio-economic *milieu*, the presence of incentive is essential to the initiation and pursuit of socially useful activities. Action results when the utility perceived to be associated with such action sufficiently outweighs its estimated cost. Control of family size, development and adaptation of new technology and avoidance of environmental degradation take place, therefore, when these conditions are realizable and when their realization is perceived by decision-makers as yielding advantages in excess of costs. Then adequate incentive to act is present.

55. Even though, in the aggregate, advantages greatly exceed disadvantages, appropriate action is likely only if costs and benefits are sufficiently internalized, and hence incident upon the decision-maker. For he acts in the light of his estimate of the costs anticipated to be incident upon him and of the benefits likely to accrue to him. If anticipated benefits are widely distributed, whereas expected costs are incident upon a decision-maker, he will not act unless appropriately subsidized. Similarly, if anticipated costs are widely distributed, while benefits flow to a decision-maker, he will act adversely to community interests, even though in the aggregate, the current and future costs of this action greatly exceed the benefits to which it gives rise; hence, the action in question needs to be prohibited, unless the gap between social costs and returns is negligible.

56. By way of illustration, consider problems associated with developing technology domestically, or adapting technology originating in a developed country, and hence economically costly or likely to make the importing country too dependent upon external sources. [64] While mechanisms underlying the development of sophisticated technology often are of limited applicability to the technological needs of a developing country, [65] these countries often can facilitate the flow of information concerning the implementation of domestically useful technological options, [66] particularly because it is "explicit recognition of an important need" that often leads to technological solutions based on science already available. [67] Furthermore, keys to the solution of many problems, agricultural and otherwise, are readily available in foreign publications to which Governments can facilitate access, especially when problems and needs arise. Such action may generate an environment of innovation-oriented incentive, as well as close co-operation between industry and university scientists.

57. Agriculture presents similar problems of importance because a quantitatively and qualitatively adequate supply of food and nutrients is essential to the prevention of malnutrition, so unfavourable to health and productivity, [68] as well as to the control of inflation; and often quite unfavourable to economic development. [69] Modernization of agriculture, the key to the adequacy of nutrients, is contingent upon active support by the public sector, as the rewards of private investment in agricultural progress may not be sufficiently internalized to give maximum impetus to such progress [70] or to prevent fertility-destroying over-cultivation [71] and other environment-degrading activities that in the long run can reduce agricultural capacity.

58. Mobilizing incentive to avert environmental degradation becomes more difficult when internal obstacles are accentuated by international relations. An example is preservation of the quality of coastal or offshore waters; these comprise about 8 per cent of the surface area of the world's oceans and condition the food- and recreation-supplying capacity of coastal

[63] A number of issues tangential to this paper have been treated in H. E. Daly, ed., *Toward a Steady-State Economy* (San Francisco, Freeman and Co., 1973); see also *Daedalus*, Fall, 1973, devoted to "The no-growth society".

[64] See, for example, Robert Gillette, "Latin America: is imported technology too expensive?", *Science*, 6 July 1973, pp. 41-44.

[65] See *Science, Technology and Innovation*, prepared for the National Science Foundation by Battelle Laboratories (1973).

[66] National Science Foundation, *Technological Innovation* (Washington, D.C., 1967).

[67] See W. J. Price and L. W. Bass, "Scientific research and the innovative process", *Science*, 16 May 1969, pp. 802-806; E. A. Haeffner, "The innovation process", *Technology Review*, vol. LXXV (March-April 1973), pp. 18-25.

[68] See R. J. Muscat, *The Nutrition Factor* (Washington, D.C., The Brookings Institution, 1973); P. Belli, "The economic implications of malnutrition: the dismal science revisited", *Economic Development and Cultural Change*, vol. XX (October 1971), pp. 1-23.

[69] See, for example, Joan Robinson, *Economic Philosophy* (Chicago, Aldine Publishing Co., 1967) pp. 120-121.

[70] See J. G. Williamson's review of Y. Hayami and V. W. Ruttan, *Agricultural Development: An International Perspective* (Baltimore, Md., Johns Hopkins University Press, 1971), in *Journal of Economic History*, vol. XXXIII (June 1973), pp. 484-487, especially p. 486.

[71] See, for example, Michael Nelson. *The Development of Tropical Lands* (Baltimore, Md., Johns Hopkins University Press, 1973).

areas.[72] As a result, joint action by contiguous countries, as well as action by individual countries, often is indicated

59 Interpretation of the impact of technological change presents difficult problems For curbs upon technological change, although designed to prevent adverse environmental effects, can reduce incentives to potentially useful technological change at both the innovator and the inventor levels.[73] Achievement of balance between these two opposed effects may be facilitated, however, by distinguishing irreversible effects from those which are reversible—a distinction sometimes difficult to make since longer run effects of given technical changes may not be easy to anticipate.[74]

[72] D L Inman and B M Brush, "The coastal challenge", *Science*, 6 July 1973, pp 20-32

[73] Application of invention, and knowledge underlying it encourages the further growth and application of knowledge See Simon Kuznets, *op cit*, pp 331-332

[74] *Ibid*, pp 349-354

RESOURCES, ENVIRONMENT AND THE RATIONALE OF POPULATION POLICY *

Mogens Boserup **

1. The first section of this paper deals with the very general but crucial problem of whether decisions on long-term quantitative population policy could or should be influenced (or even determined) by environmental considerations and by availability of natural resources.

2. At a lower level of generality, there are a number of important interrelationships between resource availability and environment, on the one hand, and population trends, on the other. These questions are briefly considered in the second section.

3. Lastly, in the third section the concept and measurement of exhaustible resources are examined.

THE DANGER OF REDUNDANT ARGUMENTS FOR POPULATION POLICY

4. To begin, one may ask what is the principle, or main line of reasoning, upon which a decision on the limitation of population growth can be rationally based. This topic can be further specified as two questions, by which the resources-population issue is approached from slightly different points of view:

(*a*) The question of the extent to which relative abundance of natural resources (agricultural land, mineral and fuel deposits etc.) can be regarded as a sufficient argument for not bothering about reduction of fertility in countries where rates of population growth are now high;

(*b*) The question of the extent to which scarcity (actual or expected) of natural resources is a necessary (effective) part of the motivation for adopting a long-term population policy designed to achieve the reduction of rates of population growth.

5. As soon as one begins to discuss these matters, it is immediately apparent that there are widely diverging expert opinions concerning the long-term prospects for sufficiency or depletion of natural resources for material production (energy, raw materials, food etc.). Indeed, expert opinions range all the way from extreme optimism to extreme pessimism.

6. However, this wide divergence of views need not necessarily prevent an articulate debate on the rationale of policies for the limitation of population growth, for it is, perhaps, pertinent to ask whether this question of depletion (real or alleged) of natural resources is at all relevant for the discussion of whether there is a valid case for a policy of limitation of fertility in countries where the growth rate of population is high.

The doubtful relevancy of resources

7. Clarity on this preliminary question is crucially important. In the author's view, the answer to the questions just formulated must be in the negative: even the most optimistic assessment of the prospective supply of natural resources and of new technological breakthroughs cannot lead to the conclusion that there is no need for a policy, to begin now, concerning limitation of fertility. In other words, the need for a long-term quantitative population policy is only slightly less urgent in countries with no resource problems than in countries where grave resource problems are thought to exist. Three interconnected arguments for this view are set forth below.

8. First, once the question of natural resources is set aside, one is led to consider one particular "resource", the prospective long-run supply of which points towards scarcity, without any possible doubt and controversy. This "resource", which is inexorably limited in the longer run, is, of course, mere space for human social life in decent, peaceful and civilized forms. Only in this sense is it undoubtedly true to say that humanity is placed in "a finite world", as the saying goes.

9. Secondly, however, objections will be raised that the argument given above is not universally valid. In sparsely populated countries, with relatively abundant natural resources, the "mere space" limitation just mentioned is often brushed aside as a postponable problem, i.e., as an insufficient argument for the urgency of a quantitative population policy.

10. To this answer, the appropriate rejoinder is that to postpone dealing with the problem could be warranted only where one additional condition is fulfilled, namely, that the rate of population growth in the country or region concerned is already at a comparatively low level (say, less than 1.5 per cent per annum). In countries where population growth has for many years been at a high level—say, 2 per cent per annum and above, i.e., doubling periods of 35 years or below—population dynamics is imbued with considerable inertia, that is to

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say, the "braking distance" for slowing down the rate of growth is so long that it may be wise to begin to apply the brake now, in order to avoid drastic and painful measures in future, when the threat of overcrowding begins to appear. As is well known, the painfulness of fertility control coming "too late" is not only that the measures themselves might have to be all the more stringent, but that a sharp decline of fertility, suddenly imposed, necessarily gives rise to large and undesirable swings in age distribution [1]

11 This reasoning might be controverted by the suggestion that in the next few decades, with some increase in *per capita* income and in the degree of urbanization, and perhaps with striking progress in the techniques of mass communication, a conspicuous decline of fertility can be firmly expected, even in the absence of any official policy favouring the limitation of the number of births

12 At this point, the dispute is likely to end in some disagreement with respect to whether it is safe—or far too bold—to rely so heavily on the expectation that a mechanism linking economic growth and human fertility will not only work (which is plausible), but will do so in a fairly swift and smooth way, without any appreciable time lag.

13. Thirdly, it is important to distinguish between the concept of a permissible rate of increase of population, on the one hand, and the ideas, as they exist at any particular time, of the size or density of population which, given time, might "finally" be acceptable in a given country The point is, of course, that even if the country in question is currently very thinly populated in relation to what is thought to be its potential resources, a high rate of increase may place an excessive burden on the economy in the form of "demographic investments" (machinery, dwellings, schools etc) required to keep *per capita* equipment with capital unchanged Thus, there are undoubtedly areas which, by any possible definition, appear to be underpopulated, so that a doubling or trebling of the current population would be regarded as not only inevitable, but desirable This does not imply, however, that at the same time, a case does not exist for beginning to reduce the rate of population growth in these areas to manageable levels, say from 1 to 1.5 per cent per annum The point can be put more simply by saying that there is no danger—given current rates of fertility—that an active population policy begun now would soon bring rates of population growth down to undesirably low levels

14 While the distinction between a permissible rate of growth and a supportable final size of population is important for clear discussion, it must be stressed, at the same time, that the concept of a "limiting population size" is highly elusive and scarcely lends itself to meaningful quantification Such quantification would require unobtainable information about both technological and sociological developments in future. To make matters more difficult, these two types of change are interdependent, since the size of population that is "sociologically supportable" depends upon the economic feasibility (determined by technological innovations) of spreading the population more evenly over the territory.

15. Still less can any meaningful statement be made about the total number at which the world population will eventually have to be stabilized, whether it is, say, 10, 20 or 30 thousand million. However, while the meaninglessness of such figures cannot be stressed too strongly, it is also important to realize that such quantification is by no means a necessary prerequisite of firm and rational decisions to be taken now with respect to quantitative, long-term population policies in those large parts of the world where rates of population growth are high This is so because of the long "braking distance" previously mentioned, which means that it is desirable, in any event, that rates of fertility should be reduced to manageable levels as soon as possible. If this goal is achieved, it can be left, and indeed it must be left, for a future time—when the rate of population growth has been considerably reduced—to judge whether, and with what degree of urgency, further reduction of fertility towards replacement levels is desirable

Four types of countries

16 The foregoing discussion may be further clarified by comparing and contrasting some important countries or groups of countries with markedly different demographic patterns In order to construct an extremely simple 2 × 2 matrix, a distinction may be made, on the one hand, between countries with high and low rates of population growth, to be named "Fertilia" and "Sterilia" The other distinction made is between high and low population density, characterized by the adjectives "densa" and "sparsa" [2] Thus, there are four characteristic groups of countries, and it would appear that most countries can, without too much over-simplifying be allocated to one of these four groups At the same time, this grouping points out those circumstances which are likely to influence the view of Governments with respect to the desirability and the relative urgency of embarking on an active, long-term quantitative population policy. (See table below)

17. First, ignoring the distinction by degree of density, it is to be observed that only developing countries are to be found in the two upper boxes—Fertilia densa and Fertilia sparsa Conversely, only developed countries can be placed in the two lower boxes, Sterilia densa and Sterilia sparsa. Indeed, in most recent years, in particular since 1972, with spectacular declines of the number of births in the Federal Republic of Germany, the Netherlands, the United Kingdom and the United States of America, to name only four par-

[1] J Bourgeois Pichat and S A Taleb, "Un taux d'accroissement nul pour les pays en voie de developpement en l an 2000 Rêve ou realité", *Population* (Paris), September-October 1970

[2] The latinizing terminology is borrowed from an article by J E Meade 'Population explosion, the standard of living and social conflict", *Economic Journal*, vol 77 (June 1967), pp. 233-255

Growth rate of population	Population density	
	High	Low
High	*Fertilia densa* Indian subcontinent Java	*Fertilia sparsa* Continental Latin America Africa south of the Sahara
Low	*Sterilia densa* Belgium Federal Republic of Germany Japan Luxembourg Netherlands United Kingdom	*Sterilia sparsa* Northern Europe Union of Soviet Socialist Republics United States of America

ticularly important examples, it has become even truer than it formerly was that the world is split into two sharply distinguished groups, those which are developed and have low or very low rates of population growth, and those with low income and high rates of population growth.

18. Now, contrasting the two upper boxes in the matrix, the question to consider is the extent to which, in what sense and at what risk it can be said that the continuation of high rates of population growth (say, above 2 per cent per annum) is unproblematical—or even desirable—in a country of the type here designated as "Fertilia sparsa", i.e., a relatively resource-rich and "empty" country. For example, one might think of Brazil, with a growth rate considerably higher than that of India and a population density comparable to that of the Union of Soviet Socialist Republics.

19. Next, consider the contrast between the two lower boxes, i.e., densely populated Western European countries where population growth rates have been low, and are currently extremely low, and, on the other hand, sparsely populated countries with a modern pattern of fertility. This comparison draws attention to the fact that in some countries, the density of population has already reached a level where it may seem desirable, chiefly for reasons of sheer space, to maintain the current low levels of population growth either by natural means or by way of immigration, or even attempt further reductions.

20. Lastly, consider the contrast, within the group of low-density countries, between those with high and those with low rates of population growth, say, Brazil as contrasted with the Soviet Union. This comparison suggests—what is perhaps the upshot of this schematic overview—that only for those countries where current density and current growth rates are both low could it be plausibly said that there is no strong case for a purely quantitative, long-term population policy.

21. This one group of countries—"Sterilia sparsa" —is in the lower right-hand corner of the matrix. It would seem that, even when account is taken of the recent drastic declines in births, there are only four areas that clearly belong in this group, namely, North America, the USSR, Northern Europe, and, perhaps, some Eastern European countries.

22. To sum up, the main point of the argument developed above is that a rational discussion for and against a long-term quantitative population policy does not depend in any important way upon the view one takes of prospective scarcity or abundance of natural resources. As far as carrying capacity is concerned, the certain limitation for the human species, and, therefore, the true rationale of quantitative population policy, is not to be sought in the production possibilities—for raw materials, energy etc., but in the possibility of viable social patterns under very high population density per unit of area. With respect to the rate of population growth at any particular time, a limit is imposed, of course, by the community's capacity to organize and finance investments.

Environment and population policy

23. Thus far, the question of resources in relation to the broad issue of long-term quantitative population policies has been considered. Turning now to the other key word in the title of this Symposium, "environment", it must first be decided what this word stands for in the present context.

24. The problem is whether the term "human environment" is here to be taken as the sum total of all those conditions which determine the carrying capacity of a given territory. In that case, it is more or less equivalent to the concept of "space for civilized social existence of human beings", as used above, and nothing then needs to be added here.

25. But if the word "environment", as used in connexion with this Symposium, is meant to be more or less synonymous with "pollution" (in the broad sense of "degradation"), the question arises whether considerations of environment (in the sense just mentioned) should enter as necessary elements in a discussion of long-term quantitative population policy. In other words, one may ask whether opinions about the extent of pollution and related problems, and about the cost

of pollution control, could make any difference in a rational discussion for and against long-term population policies

26 The answer to this question must be in the negative Opinions on the economic dimensions of the pollution problem diverge as widely as do opinions on resource sufficiency At one end of the scale are experts who are of the opinion that pollution control (even in a wide sense) is an important, but perfectly manageable, economic problem, perhaps a matter of 2-3 per cent of gross national product for a number of years, and far less thereafter At the other end of the scale are, to take a drastic example, the assumptions in the Club of Rome book, *The Limits to Growth* [3] This is not the place to discuss the correctness of these views, for the point is that whether one adopts one or the other of these extreme views—or an intermediate view—one's judgement about the necessity of population control in countries where rates of population growth are currently high must be exactly the same, provided the discussion is conducted in rational terms

The need for "Occam's razor"

27 In a way, the preceding reflections are a quest for the use of "Occam's razor". This rule says that if a conclusion (for instance, that population growth rates need to be reduced where they are high) can be reached without assuming this or that hypothesis (for instance, that minerals are going to be very scarce), then there is no ground for assuming that hypothesis

28 This golden rule is recalled not just for the sake of orderly discourse, but because there is, in the present context, a grave danger in redundant arguments If the case for an active population policy, the objective of which is the reduction of fertility levels, is supported by inessential or redundant arguments, such as the danger of resource depletion or the dangers of pollution, one risks, in the longer run, seeing the well-known effect of crying "wolf" If, in a not-so-distant future, the view will have gained wide acceptance that the danger of resource depletion, as currently understood, is remote, the risk is that a more relaxed perception of the resources problem could then become the pretext for a relaxation of efforts for the control of population growth, because what was—mistakenly—supposed to be a major cause for misgivings on population growth will appear to have vanished Similarly, if the pollution issue is used as an argument to persuade people of the need to control population growth, the danger is that the spread, at a later stage, of less dismal views on the costs and potentialities of pollution control might give room for unwarranted complacency in matters of population control

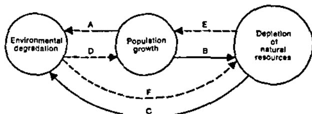
[3] Donella H Meadows and others, *The Limits to Growth A Report for the Club of Rome's Project on the Predicament of Mankind* (New York, Universe Books, 1972)

CONNEXIONS BETWEEN POPULATION, RESOURCES AND ENVIRONMENT

29. In a first and quite schematic approach a simple question may be asked concerning the main causal links between trends in the three fields of population growth, deterioration of environment and resource depletion [4] One may ask about the ways in which trends in one field may be expected to reinforce (or weaken) the trend in another field, thus worsening (or mitigating) the problem within the other field.

30 Among three entities there are, of course, six possible bilateral flows from cause to effect Three of these, indicated by broken arrows in the figure, can be safely omitted The effects of environmental trends and of resource depletion upon the rate of population growth (the arrows "D" and "E") are major features in some apocalyptic views of future trends, to be found, for instance, in *The Limits to Growth* [5] This seems far-fetched, although some special connexions may conceivably exist, for example, the as yet unproven possibility that carbon monoxide from motor-car exhausts might explain the higher frequency of heart attacks The causation link from environment to resource depletion (arrow "F") is ignored because it seems to be an unfruitful approach It is more pertinent to say that environmental degradation (pollution) can sometimes be regarded as being (rather than causing) a kind of resource destruction, just as anti-pollution measures may be a way of salvaging resources (e.g., recycling)

Possible bilateral flows from cause to effect



31. Thus, three of the six possible causal connexions seem to be worth considering They are indicated by solid lines in the figure and are discussed, with extreme brevity, in the remaining part of this section

Effects of population growth on environmental degradation [6]

32. As already mentioned, the pollution danger is not an effective (necessary) argument in favour of long-term population control. Admittedly, there is some

[4] Note that the discussion concerns the depletion of exhaustible resources Not considered are the problems of resources which, although limited, are under proper management, inexhaustible, for instance, agricultural land.

[5] Donella H Meadows and others, *op cit.*

[6] Here and in the following discussion "environmental degradation" is taken as broadly synonymous with "pollution in a wide sense".

truth in the view that the amount of pollution, and other environmental deterioration, increases with population increase, but this danger can easily be exaggerated. Far more than by the sheer increase in human numbers, current levels of pollution are caused by the growth of *per capita* income, and by the particular way in which increasing income is spent (industrialization, especially chemicals and motorization). This point can be illustrated by the figures following showing total increases over the 20 years from 1950 to 1970 in the industrialized free-enterprise countries:

	Index 1970 (1950=100)
Population	124
Gross national product in real terms	135
Volume of industrial production	173
Chemical industry	522
Number of motor-cars (United States of America)	105
Number of motor-cars (other countries)	820

33. In short, even if population growth were to cease altogether (not a fanciful hypothesis for the industrialized part of the world, where the pollution problem is chiefly located), pollution and other environmental problems would not appear as less important and less urgent than they currently are.

34. Turning to the developing countries, the environmental problem presents itself in a different way, which makes it more difficult (but perhaps, also, less imperative) to take full account of environmental aspects in framing policies which influence the territorial distribution of economic activity and of people in a growing population. The problems that arise in most developing countries are related to regional disparities and to the persistently strong trends towards migration from the countryside to towns.

35. Concerning regional disparities, some planners maintain that it is often too costly to attempt to distribute development activity widely over the territory. The problem reduces itself to the question of underutilization of infrastructure. Concentration of economic development at "growing points" may be economically indicated for an initial period, which may be quite long, and it is unlikely that environmental considerations could, with good reason, often dictate another policy. This whole issue of spread *versus* concentration of development efforts is far from having been settled.

36. The net flow of people from the countryside to towns, and especially to large cities, is a universal tendency of the current time throughout the developing world, in Asia, Africa and Latin America. This trend is probably to be explained primarily as a response, both sociological and economic, to improved communications, and it gives rise to a number of important problems of economic and social policy which are beyond the scope of this article.

Effects of resource use on environment

37. It is often assumed, rather thoughtlessly, that depletion and pollution are two disasters which always proceed together, depletion reinforcing pollution. On the contrary, it is worth pointing out that it is the other way around in the case of oil and natural gas, the sole cases of prospective scarcity or exhaustion, which is both important and improbable. For, assuming that the alternative sources of energy do materialize (so that the substitution of coal for dwindling supplies of oil and gas can be avoided), one would, by the same token, avoid the air-pollution effect of burning these fossil fuels.

Effects of population growth on resource depletion

38. This issue is highly controversial. For instance, if one asks how long the mineral resources of the earth can last, answers range from "a few decades" to the statement that mineral resources can last at least as long as mankind has any chance of lasting, in other words, that these "exhaustible" resources are practically inexhaustible *sub specie humana* (as distinct from the "cosmic" prospective).

39. Perhaps, then, the problem of resource depletion should be viewed as depending more importantly upon the rates of economic growth than upon population growth. But this latter view is also controversial, for is it not equally true that economic growth as such tends to "create" resources, and, indeed, that the amount of natural resources, rationally estimated, has in recent decades been increasing by leaps and bounds. It is interesting, incidentally, that the feat of depletion of resources arises precisely at a time when, in view of technological breakthroughs, such fears would appear to be less warranted than at any other time since man began to worry, some 200 years ago, about the sufficiency of natural resources.

40. Indeed, the very concept of resource depletion needs scrutiny, which is attempted in the following section.

THE SPECIAL PROBLEM OF EXHAUSTIBLE RESOURCES: DEPLETION OR GROWTH OF RESOURCES

The elusive concept of exhaustible resources

41. The very idea of "exhaustible resources" immediately suggests the question of the rhythm of exhaustion. The question may be asked if there are general and rational rules by which it can be determined at what rate exhaustible resources will be exhausted, or ought to be exhausted, given some specified political goals.

42. In order to see clearly the essence of the problem, only natural resources for material production which are exhaustible, or believed to be so, are considered. Thus, such scarce resources as natural scenery, opportunities to be alone etc., are not considered.

43. Quite arbitrarily, one may take copper ore as a typical example. It is thought of as existing in a considerable number of deposits, whether exploited or not, which are owned and run by private firms in active competition. Further, suppose that every firm has a realistic idea of the amount and quality of the copper

ore in the deposits it controls Lastly, suppose that all of the ore is equally accessible, so that a firm's cost of extraction can be taken as independent of the amount of copper ore that has been extracted throughout the past lifetime of the mine.

44 Now, there is an old and well-known textbook rule to answer the question of how a mining firm would spread its total extraction from the mine over time, i e., the tempo of exhaustion. The rule is simple in itself, but it becomes highly problematical when confronted with realities, as will be seen

45 The rule says that the firm will "stretch" the production over future years in such a way that total net income throughout the lifetime of the mine, discounted to current value, will be maximized This condition will be fulfilled, of course, when the rate of output of all copper mines taken together is at such a level that the expected future annual percentage increase in net proceeds per ton (owing to increasing scarcity) equals the interest rate with which the company has to reckon

46 The rule is obvious once it is realized that there is a loss of interest involved in leaving the ore unmined, as "dead capital". Thus, the higher the rate of interest, i e., the heavier the discounting of future income, the less "conservation minded" the firm will appear to be

47 For a mining firm enjoying a more or less complete monopoly position, the same reasoning would apply, except that a monopolistic mine owner would have the added incentive for restriction of current output, thereby enabling him to raise the current price Thus, its production policy might be expected to be somewhat more conservation-minded than that of an enterprise fully exposed to competition

48 So far, the "pure theory" of exhaustion of exhaustible resources has been discussed The trouble is, however, that there is nothing in real life that corresponds to it According to the theory, mining firms, whether under competition or monopoly, would see their interest in a kind of conservation policy, limiting their current output to a level lower than that which would give the highest current profit. But the simple fact seems to be that in real life, as far as actual experience goes, private owners of exhaustible resources have tried to pursue an output policy designed to maximize current profits. [7]

49 This apparent contradiction between theory and reality is understandable, once the assumptions of the theory are further specified

50 The conclusion that the owner of the exhaustible resource will economize on output (and the more so, the lower the rate of interest) is based upon the dual assumption that. (*a*) the producer expects increasing scarcity and, therefore, increasing net proceeds for the product in future years, and (*b*) he assumes that one additional ton produced today necessarily involves a corresponding limitation on the amount of copper ore he will be able to produce in future years. But this assumption (that more production today must mean less production tomorrow) implies not only that the amount of copper ore in any particular deposit is, in fact, limited (so that the mine can be exhausted), but that the producer considers it certain (or at least probable) that the deposits will, in fact, eventually be exhausted [8]

51. It is this latter assumption that does not appear to be valid in the light of the actual behaviour of owners of exhaustible resources, be they competitors or monopolists They appear to act as if the exhaustion of the "exhaustible" resource were a rather unlikely event, or *at least an event in a future so remote that a restrained* production policy, far from securing maximum profit over the lifetime of the resource, entails the danger of missing a profit by not taking it home now [9]

52 It is highly significant that in 1931, when the theory of exhaustible resources was first spelt out in an important article by Harold Hotelling, [10] it was only mentioned parenthetically, as something that might conceivably happen, that a resource, which at a certain time was regarded as exhaustible, would, in fact, as time went on, become less scarce [11] Today, one would be more inclined to make the opposite assumption, namely, that many of the resources that are regarded as exhaustible and limited will, in fact, never become exhausted, because it will not be economical to continue production, in the light of future technology and increasing knowledge of other and cheaper resources, which can serve the same purpose in production

53 Thus, over the past 40 years a major change has occurred in the economic theory of exhaustible resources The new technical dynamics should profoundly change the ideas about kinds and quantities of natural resources, and make people realize that the amount of "exhaustible" natural resources for production, when counted in the rational way, has, in fact, been increasing by leaps and bounds, and is likely to continue to increase for quite a long time

54. This contention about an increasing volume of resources seems shocking, and even somewhat blasphemous, to many people of good will who are fearful that mankind is rapidly wasting nature's gifts Some further elucidation may, therefore, be warranted

Measuring the amount of natural resources

55 Even in terms of purely physical units, the measurement of natural resources is intricate.

56 Continuing with the example of copper ore, one may ask how much of it there is. First, one must decide whether only firmly proved reserves are to count, or

[7] Richard L Gordon "A reinterpretation of the pure theory of exhaustion", *Journal of Political Economy*, vol 75 (June 1967), pp 274 86

[8] *Ibid*, p 275

[9] Fear of expropriation might further raise the rate of extraction

[10] Harold Hotelling, "The economics of [illegible]tible resources", *Journal of Political E[illegible]*, vol 39 [illegible] 1931), pp 137-175

[11] *Ibid*, pp 153 *ff* and 159

whether assumed, probable or even possible reserves should be added, perhaps with some appropriate reduction. The decision is, obviously, a rather subjective one.

57. Next, there is the problem of quality, which, perhaps, is less difficult so long as the goal is only a purely physical inventory. With mineral deposits, at least, it is often possible to estimate the degree of concentration at various depths, so that, in principle at least, the calculation in terms of some standard measure (ton of pure copper etc.) should be possible.

58. But a measurement in physically defined units is quite unsatisfactory. One wants to take the economic dimension into account, and thus one must decide what is "usable" and what is not, and for that decision everything depends upon time (the techniques available) and place (transport costs, with varying techniques). Thus, the "quantities" (in any relevant sense) of exhaustible resources change over time, not only because of extraction and use of existing quantities, but because, with the passing of time, technological innovation changes the notion of what the resources are.

59. Hence, one cannot even begin to talk about the existing quantity of a given exhaustible resource at a given time without explicit or implicit assumptions about techniques. And it is not enough in modern times —as it may have been in earlier times—to assume "technology as now known", for it is certain that technology will not remain unchanged. New possibilities continually arise for using a given natural product—or for doing without it—in part because of a reduction of raw material input for a unit of final product, and in part because of the use of substitutes.

60. Thus, the quantities of natural resources can increase. The ways in which this happens may be roughly grouped under three headings: known deposits; discovery of hitherto unknown (or only suspected) deposits; and new kinds of natural resources.

Known deposits

61. The known deposits increase, in the economic sense, when technical innovation makes it worth while to exploit them more intensively and to begin extraction from deposits hitherto known, but considered uneconomic. Improvement in transportation is particularly important in making remote deposits profitable.

Unknown deposits

62. With regard to discovery of hitherto unknown, or only suspected, deposits, an important distinction is to made here between discoveries that are the fruit of specific efforts to find more of a particular kind of resource, and, on the other hand, the general progress of geological prospecting and mapping, which proceeds more or less continuously, though at very different speeds in various countries.

63. Prospecting for oil and natural gas is typical of the first type of discovery, and it is of particular interest because this costly drilling activity is undertaken only with a view to production needs foreseen for a fairly short period ahead. Indeed, reserves are "discovered" as the need for them arises; they are "produced", as it were. This explains why, since the 1930s, "known oil resources" have continually constituted from 20 to 30 years of consumption.

64. The kinds of resource increase mentioned above under (1) and (2) are well known and even trivial. What is new is the unprecedentedly rapid rate at which the quantities of already known kinds of resources have been increasing.

New kinds of natural resources

65. The third form of increase, new kinds of natural resources, is not trivial. Throughout the history of civilization, it has happened that materials and other phenomena in nature, which had hitherto been regarded as not being useful for the satisfaction of human needs, became "resources" owing to scientific and technological progress. What is new in recent decades is that this transformation of useless matter into valuable resources has been happening at a rate undreamed of by the most boisterous optimist.

66. A few conspicuous examples may be mentioned. Until 1942, the only practical use of uranium was to give a yellow tone to glass and porcelain. Other possibilities for the future are: common rock as the basis for extraction of metals (given sufficient energy); the mineral riches of the sea-bed; and, as concerns energy, the hundredfold increase of the "quantity" of uranium by way of the fast-breeder reactor and fusion energy from common sea water.

67. These indications sufficiently illustrate the contention that the "amount of natural resources", if calculated in a rational way, must have been increasing rapidly in recent decades.

A case for economizing natural resources?

68. Of course, exhaustible natural resources have to be used in an economical way, as does everything else that is not freely available in unlimited quantities. The question to be asked is the less trivial one of whether there is a convincing general case for economizing exhaustible natural resources in the sense of special arrangements—such as taxes or direct regulation—designed to achieve a rate of extraction lower than that which results when extraction and consumption are limited only by the rule that all social costs, including environmental damage and other external costs, must be covered.

69. In order to pose the question as sharply as possible, one may consider the important and topical example of oil and natural gas. Expert opinion varies with respect to timing, but all agree that the remaining amount of oil and natural gas, known and still to be discovered, cannot cover a continued increase of consumption for many decades. Now suppose, for the sake of argument, that one had a perfect socialist international order, with full public control of the use of natural

resources and acting on the maxim that the interest of coming generations should weigh as heavily as that of the current generation. In this hypothetical situation, one asks whether the policy would be different from that which is now being pursued; whether the ideal international authority here assumed would make a strong effort to hold down the consumption of oil and gas in the interest of future generations

70. As previously mentioned, experience seems to show that private owners of exhaustible natural resources tend to act on the assumption that future technological development and the rate of discovery of natural resources will become less rather than more scarce as time passes Our question then is whether a fully socialized decision process would lead to a more "conservationist" result

71 The answer must be that the result might be either way It cannot be known *a priori* whether a social husbanding of exhaustible resources would be more or less restrictive (more or less "pessimistic", if you like) than a private one.

72 This is not meant to imply that the solution given by the market mechanism is particularly desirable, or even "optimal". The point is that both the private-enterprise and the socialist decision-maker have to make a judgement, which can at best be only an informed guess, with regard to whether any particular natural resource is going to be more or less scarce in future than it currently is. All one can say is that, presumably, the socialist decision-maker will be inclined to take a somewhat longer view, which should lead to a somewhat slower use of the resources concerned. But it would be an open question whether, in retrospect, when the future has become the present, this more cautious policy would have been well-advised [12]

73 For instance, imagine that Jevons' famous book, *The Coal Question* [13] (1866), had been taken seriously, and that a policy restraining the use of British coal reserves had been initiated In retrospect, it was undoubtedly fortunate that no well-meaning, but misguided, fear of resource depletion was at that time allowed to limit the rate of progress for the benefit of future generations.

74. A more modern example may be seen in the change, in the past two decades, in the orientation of conservation policy in the United States of America

75. Originally, the concern of the conservation movement was directed towards three problems: (1) to economize exhaustible resources; (2) to prevent over-exploitation or other deterioration of the non-exhaustible, but limited, resources (for instance, erosion of good agricultural land), and (3) to conserve the natural heritage, such as landscapes Very broadly, the current conservation movement is about to give up item (1) as a goal, which is no longer quite relevant in view of technical developments, item (2) has been preserved more or less unchanged; and item (3) has acquired far more weight in the programme, owing to the interest in pollution and other problems of environment. It is characteristic that the fight against the Alaskan pipeline is motivated by considerations of environment and not of exhaustion

76. The change concerning item (1), the economizing of exhaustible natural resources, is due, of course, to the explosive development of technology, as a consequence of which the very concept of "exhaustible resources" tends to evaporate. This new orientation in the conservation movement in the United States of America is explained in a book sponsored by Resources for the Future [14] The authors mention the traditional idea of a dualistic economy, where industry works under the law of increasing returns, thanks to technological progress in the industrial process itself, but, at the same time places ever more voracious claims on the limited amounts of fossil fuels and metals etc , which obey the law of diminishing returns And they continue

> "These earlier, simplistic views of a world divided into two economic sectors—one progressive, but recessive, the other regressive and dominant—have continued to govern economic thinking down to the present time Yet they   border on the archaic The transformation of materials into final goods has become increasingly a matter of chemical processing It is more and more rare for materials to be transformed into final products solely by mechanical means The natural resource building blocks are now [illegible]
>
> manipulating the available store of iron, magnesium, aluminium, carbon, hydrogen and oxygen atoms, even electrons This has major economic significance It changes radically the natural resources factor of production for societies that have access to modern technology and capital " [15]

77 This text, written in 1962, was an early and clear recognition of a new tendency in modern technology. This tendency was further confirmed in the subsequent decade, with the possibilities now more distinctly envisaged of extracting metals, energy etc from materials—rock, the sea-bed, sea-water—where they exist in large amounts, though in an extremely low degree of concentration To give just one example in ordinary sea-water, there is one atom of the hydrogen isotope deuterium for every 6,500 atoms of ordinary hydrogen, and by weight deuterium makes up 0 003

[12] But note that the discussion is about natural resources for material production What is said here does not necessarily apply to resources such as landscape or recreational facilities

[13] William Stanley Jevons, *The Coal Question an Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of our Coal Mines*, 2nd ed , revised (London, 1866).

[14] Harold J. Barnett and Chandler Morse, *Scarcity and Growth The Economics of Natural Resource Availability* for Resources for the Future (Baltimore, Maryland Johns Hopkins Press, 1963).

[15] *Ibid* , p 237.

per cent of sea-water. Yet, it is this utterly small part of the sea-water which, in the fusion reactor of the future, is designed to provide practically unlimited amounts of energy.

Special cases

78. It was argued above that the world is not entering a period of generally increasing scarcity of natural resources. But this argument, of course, does not rule out the existence of special cases. In order to qualify as a genuine exception, a specific material would have to pass a fourfold test: (1) it must be certain, or probable, that the remaining deposits, known and unknown, are quite limited in relation to current annual consumption; (2) it must be clear that the existing quantity cannot, without disproportionate cost, be conserved by way of recycling; (3) the material in question must be needed for purposes which are undoubtedly important; and (4) it must be probable that, for these important uses, no economically acceptable substitutes can be found.

79. Materials which are, or threaten to become, scarce in this full sense do exist, but they seem to be few in number. Helium is often mentioned as an important example, and as a strong case for husbanding by international action. Phosphate rock for fertilizer has also been mentioned, although the need for husbanding is probably for a more remote future. The known reserves of mercury, extractable at a "reasonable" price, are said to be sufficient for only a decade or so, but the possibilities of finding substitutes seem to be greater than was previously thought. In addition to these three materials, there may be other examples of which the present writer is not aware. [16]

80. There is one other situation where a strong case can be made for restraining consumption of a material for some time. This situation arises when the effectiveness of a given exhaustible resource can be expected to increase considerably once a new, emerging technology has become operational. The one prime example of this somewhat exceptional constellation of circumstances is that of uranium, the energy-generating capacity of which will increase a hundredfold the day the fast-breeder reactor takes over.

81. There appears to be a similar situation with regard to geothermal power. In recent years, the amounts of known reserves of underground vapour and hot water have increased conspicuously; and as a response to these discoveries, new and more effective methods of multipurpose use of this heat energy are being developed. But this development takes time; and it might, therefore, be wise to delay the actual tapping of this energy until a new technology for its utilization has become operational. [17]

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[16] However, opinions among experts differ. In a communication to the author, David B. Brooks, Department of Energy, Mines and Resources, Ottawa, dismisses the fear of depletion of helium and phosphate, and considers caesium a more serious case of near-absolute limitation of supplies.

[17] See Joseph Barnea, "Geothermal power", *Scientific American*, vol 26, No 10 (January 1972).

ON THE USE OF MODELS AS INSTRUMENTS IN FORMULATING POPULATION POLICIES

Hannes Hyrenius *

1. In the discussions of recent years on the growth of population, economic development and expansion, the exploitation of natural resources and problems of environment, writers have begun to employ simplified world pictures in the form of so-called "models" The purpose of the use of these "world models" is to attempt to make clearer than hitherto the implication of these problems and, if possible, to improve society's capacity to formulate its economic, social, demographic and other policies

2 The development of models of social conditions and social evolution has been influenced by the development of econometric methods, which were, and are, mainly concentrated on economic phenomena in the strict sense The facilities available at the beginning were of a mathematical and statistical nature. More general models could be produced, however, when computers and data technique came into being as a means of assistance

3 The earliest attempts at models of social development were mostly deterministic (non-probabilistic) in the sense that relations and connexions were fixed This restriction was soon eased, when work was carried out on several alternative levels and with several sets of parameter values Data techniques made it possible. however, to introduce variations into the individual components by distributions combined with stochastic techniques and also by adding other kinds of random disturbances

4 The various techniques now available have been used for building comprehensive models with very high levels of ambition These models, which view human society as a system, generally include the three main factors—natural resources, population and capital—as well as an increasing number of other phenomena and subfactors

5 The possibility of including in one model all "essential" conditions and variables will, of course, depend upon the further development of technique If model-building is to serve practical purposes in decision- and policy-making, one must be able at each stage to judge the capacity of the instrument, its degree of generality, its sensitivity and its uncertainty (margins of error). One must also be able to judge how useful the method is in different sectors and areas of the global society

6 The development of comprehensive models presupposes a close collaboration between different disciplines of a methodological as well as substantive nature Reciprocal action has taken place here, and even partial, insufficient and defective efforts have had an encouraging effect on the development of methods At the same time, increasing interest has arisen within politically responsible circles and in the general public

7 The aim of this study is to find out whether the types of models developed so far—or types which can be envisaged—can be used as instruments in formulating population policies Two series of questions arise in this respect

(*a*) That of how one defines population policy, what demographic factors and processes one perhaps wants to influence, and what population-related phenomena and processes should be included under the name of economic, social or other policy,

(*b*) That of determining what properties are required of an instrument if the purpose is to elucidate and compare the effects of different alternatives in population policy

8 A closer examination was made of what one can reasonably demand of a model under various definitions of population policy As expected, the study showed that the demographic factors are so strongly related to economic, social and other conditions that even a very narrow definition of population policy requires that these relations be duly taken into account This conclusion in turn leads to a demand for what are described in the following section on model definitions as "comprehensive dynamic *d*emographic-*e*conomic-*s*ocial *mod*els" (DESMOD), regardless of how one wishes to formulate the notion of population policy.

9 As concerns the properties required in such a DESMOD, only a couple of observations can be made here. Further views are put forward in the following section

10. The interplay of the various factors must be looked upon as a system, from which it follows·

(*a*) That all factors judged necessary, according to the criteria laid down, must be included,

(*b*) That these are indicated and measured in correct (unbiased) forms and measurements;

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(*c*) That relations and feedback loops are included correctly and to the extent necessary;

(*d*) That all constants, parameters, relations and feedbacks are quantified in a satisfactory way.

What these individual requirements signify in detail cannot be stated here, of course. It may be pointed out, however, that the degree of ambition can be varied in accordance with the problems under study in separate applications and uses of the model.

Review and appraisal of selected models

General discussion

11. During modern times a large array of methods and scientific techniques has been developed which can be used in analysing economic, social, demographic and other aspects of human society. Statistical methods have, of course, played an important role in describing and analysing past and present conditions and trends. Aggregate data have been analysed and have partially been extended through extrapolations into predictions of various kinds.

12. Data on micro-levels (individual, families, households, firms) have been collected through more and more advanced sampling procedures for the purpose of filling out the knowledge of actual conditions and trends, ultimately with the aim of laying foundations for political action in economic, social, educational, health, cultural and others matters.

13. All these methods and techniques, of course, will be used in the future and will also be further developed to meet new needs. In this respect, computer technique will mean increasing capacity to carry out such analysis. In addition, however, computers offer new possibilities for co-ordinating knowledge from many fields and, simultaneously, handling large numerical materials. This latter aspect is important, because "conventional" methods are usually limited to a very few factors at a time.

14. An example is found in surveys of health conditions, where studies so far have been limited to a stratification by one or two factors at a time among income, profession, social group, level of education etc. By using a computer, one can not only add other ways of stratification and handle several of them simultaneously, but one can study the interplay of the various factors more meaningfully than before. With conventional statistical procedures, such sources of variation may be separated and eliminated in the variable under investigation. Modern computer technique, however, makes it possible also to distinguish and measure "secondary" effects of these sources of variation upon that variable.

15. A realistic approach to analysing the complicated real world leads to a compromise over which factors are to be included and to the concept of a system of variables, conditions and relations. The interrelations among factors are most easily handled by "feedback loops". These feedback loops must be based on a profound knowledge of the phenomena, and they should be formulated, quantified and tested by means of observed values and possibly, where data are lacking, by postulated values.

16. These considerations describe briefly the modern approach to various areas of knowledge. For the specific purpose of socio-economic policies, and particularly for activities directed towards population matters and population-related problems, techniques have been developed for both special (limited) and more general purposes.

17. The presentation here will be restricted in certain respects. Thus, the role of statistical methods will not be discussed, although they now cover a wide range of techniques specially developed to meet the needs in analysing socio-economic problems. As for "models", no attempt is made to enter into presentation or criticism of special fields other than that of population (taken in a wide sense). It should furthermore be observed that the discussions are limited to documents and project reports available before the end of 1973.

18. As pointed out by way of introduction, the various population factors are in general so closely connected with economic, social, cultural, religious and other factors that these cannot be overlooked in the formulation of social measures intended to influence the population factors themselves. Added to this is the fact that by means of such measures, once they are put into operation, one gets, to a considerable extent, repercussions on other sides of social life—directly or, with a certain lapse of time, indirectly.

19. These circumstances lead to the requirement that if it is to be possible to develop the model constructions into analytical instruments in policy-making, they must, as a rule, be of the advanced multifactorial sort described above as comprehensive dynamic *de*mographic-economic-*s*ocial *mod*els, "DESMOD".

Models developed at the Massachusetts Institute of Technology

20. If a number of efforts, in connexion with econometric research, to develop more general models are disregarded, the first large-scale model seems to have been what later came to be termed the "Limits to Growth" model.

21. The initiative was taken by a group formed in 1968, the Club of Rome, an informal organization whose aim is to promote interest in and knowledge of fundamental factors in the current system of life and their simultaneous interactions—factors of an economic, social, political, physical and biological nature—and to bring this new interest to the attention of politicians and the general public. In the search for suitable ways to throw light on the present and future predicament of mankind, it was decided to concentrate on the method, "systems analysis", developed at the Massachusetts Institute of Technology (MIT). These methods, which emanated in the first place from Jay Forrester, were originally designed for problems of business economics, but can also be applied in other fields.

22. The method amounts simply to this, that the relations that are considered to apply between the different factors/variables included in the system are programmed for a computer. An important technique here consists of the use of feedback loops, by means of which the interrelations are given the form of a number of modifiers. If the various relations are allotted, observed or postulated quantitative values, the system can be brought to imitate a more or less realistic "world".

23 Forrester's first draft of a World Model comprised a limited number of basic factors (population, natural resources, food production, industrial production, capital, pollution and overcrowding) After modifications and expansion, a "World 2" was published in his book *World Dynamics.* [1]

24 A team under the leadership of Dennis Meadows continued the work and built out the various subsectors in different respects. Efforts to quantify conditions and relations were broadened In 1972, the results were reported in *The Limits to Growth.* [2]

25 The publication of this book gave rise to an enormous world-wide discussion The *problematique* discussed in the book turned out to be of great general interest. Part of the misdirected criticism that appeared can probably be attributed to the fact that the technical report was not available Even a year and a half afterwards, this report is to be found only in a restricted number of copies in mimeographed form.

26 Criticism has been directed against the MIT models from a number of different branches of science A comprehensive account thereof is provided by a research team at the University of Sussex, [3] to which readers are referred In connexion with this, a couple of brief observations are made below.

27 The criticism put forward from various quarters includes a great number of constructive suggestions on how to improve the models while retaining the technique of systems analysis, or by using other methods. As a result of this, a number of new studies and research projects have been begun.

28 The authors of *Limits to Growth* themselves point out that model behaviour must be in reasonable agreement with real world behaviour. This implies the need to assemble time-series data on the variables in the real world from 1900 to 1970 The examination by the University of Sussex team suggests that the MIT models do not, on the whole, satisfy this requirement. This is in part a problem of data and in part, a question about relationships.

29 Each sector has been examined in the Sussex study by specialists and is treated in six chapters In the first chapter, "Malthus with a computer", by Christopher Freeman, it is claimed. "With the exception of the population sector they (the assumptions) are generally found to be unsatisfactory" [4] This statement, of course, is made with different levels of ambition for the various sectors

30 The judgement of the Sussex team that the population sector is satisfactory is, in the present writer's opinion, not acceptable, as is shown below Special requirements must be set up especially for population, and therefore the population sector, too, must be considered unsatisfactory, even if it is better and more detailed than appears in the text report, *Limits to Growth.*

31 In the Sussex University report, Cole describes the most important general features of the world models as

(*a*) Description of the world as a closed system with no external influences,

(*b*) Choice of major parameters,

(*c*) Major interactions of the feedback loops,

(*d*) Use of world averages for all parameters,

(*e*) Amount of detail (the number of relationships),

(*f*) Non-probabilistic nature of its predictions [5]

32 The Sussex group's analysis is carried out, among other things, by alternate runs, by which means it is made clear that the systems analysis method is highly sensitive to changes in the input values From this it also follows that coarseness short-comings and direct errors in the construction of the relations and in the quantifications may have great and possibly completely disabling consequences

33. For "World 3", the Sussex report gives an account of runs with a division into developed and developing parts It is pointed out, too, that deficiencies appearing through these exercises need not automatically lead to the rejection of a whole subsystem. Since the sensitivity of systems analysis is great, as demonstrated by several authors, a more careful expansion of interrelations and feedbacks ought to be able to correct certain short-comings.

34. A large number of constructive proposals are put forward in the various chapters of the Sussex report, and may give occasion for improvements and, in part, for separate projects

35. As a comprehensive judgement on the "World 3" model, the following points may be considered and made the objects of research contributions

(*a*) The aggregation is too strong and involves the blurring and possible disappearance of the heterogeneity in all the subsectors At the same time, it renders difficult or impossible an assessment of the various change factors that follow an acceptable extrapolation;

(*b*) In the model structure, a number of essential basic factors are lacking: social structure, technical level, educational level, morbidity and, not least impor-

[1] J W Forrester, *World Dynamics* (Cambridge, Mass, Wright-Allen Press, 1971)

[2] Donella L Meadows and others, *The Limits to Growth a Report for* [illegible] *of Mankind* [illegible]

[3] H S D [illegible]
A Critique [illegible] 1
Windus for [illegible]

[4] *Ibid*, p 7

[5] *Ibid*, p 25

tant, a value system and a price mechanism that can cover essential features in the economic processes and in social behaviour;

(*c*) The model is given out to be a dynamic one, but in several respects it is actually static or almost static. This is precisely the meaning and result of the fact that certain components essential for human society are missing;

(*d*) The use of geometrical/exponential growth in one or more components leads of necessity to catastrophic situations, even if the rate of growth is in itself small. This applies both to growth in the population and to growth in industrial production, and it applies to individual goods and to growth in animal species and plants;

(*e*) The techniques used in measuring the various phenomena are, in some parts of the model, very poor and misleading;

(*f*) The tests and adjustments made so far are carried out on units that are too concentrated and too heterogeneous. They are, therefore, to an unknown extent, meaningless for judging the validity and capacity of the models;

(*g*) Special efforts must be devoted to the development of methods for including different kinds of flows of materials, commodities, labour force, non-working population, capital etc.;

(*h*) Special models of micro-types should be inserted step by step in all sectors possible, with a view to adding to the disaggregation and precision of the internal structure.

The population sector in the "World 3" model

36. Since the population is the centre for the whole of the model work, it is particularly important for the population sector to be well constructed and quantified. This is, in fact, of fundamental importance for the whole model by reason of the arrangement of the system, and not least as a consequence of the great sensitivity of systems analysis to errors in the construction itself, to deficiencies and coarseness in the measurement of phenomena, to errors in quantification and to omissions of relevant subfactors and feedbacks. The population sector has been criticized by the Sussex group and by the Demographic Research Institute at Gothenburg, among others.

37. The first MIT models did not make use of any age grouping at all. Consequently, births and deaths were expressed by crude rates only. Furthermore, the labour force could not be measured properly. In subsequent models ("World 3", underlying *The Limits to Growth*), various improvements have been made. The handling of the demographic factors, however, still leaves much to be desired, if judged from even moderate aspirations of demographic techniques.

38. Mortality is expressed by one parameter only, the life expectancy (mean expectation of life for the new-born). This appears to be quite unsatisfactory. From a "life expectancy normal" of 28 years, four multipliers are supposed to take care of the influence of living conditions (food, health service, crowding and pollution). This influence is carried out in a complicated and controversial way.

39. Fertility is treated through an interesting combination of the fraction of fertile women and total fertility, where the latter is built on desired total fertility and birth-control effectiveness. The multipliers from living conditions are based on the influence of industrial output and perceived life expectancy. Even if the logical structure of this approach were acceptable as a beginning, it is hard to understand how a quantification of the various relations can be anything better than subjective collections of information, assembled from heterogeneous conditions. A combination must therefore offer risks of errors of many kinds.

40. For a more detailed discussion reference may be made to the Sussex report. The capacity of the model is summarized in the table given below by simply comparing the growth of the population 1900-1970, according to United Nations official estimates and those derived from "World 3" (standard run).

COMPARISON OF UNITED NATIONS ESTIMATES WITH "WORLD 3" MODEL

	Population estimates (millions)		Annual increase (percentage)	
Year	*United Nations*	*World 3 model*	*United Nations*	*World 3 model*
1900 . . .	1,650	1,610	0.60 (1900–1910)	0.89
1910	—	1,760		0.82
1920	1,860	1,910		
1930	2,069	2,080	1.06	0.85
1940'	2,295	2,380	1.04	1.35
1950	2,486	2,740	0.80	1.41
1960	2,991	3,210	1.85	1.58
1970	3,632	3,790	1.94	1.66

41. It should be recalled that the model was manipulated so as to conform with a few initial data. In spite of this, the agreements must be said to be fairly poor. Using the model on the unknown future after 1970 is therefore a highly risky adventure.

42. The birth and death rates that have resulted in these population growth rates behave according to the model, in a rather peculiar manner, and deviate, in part considerably, from what is known (or what is believed known for the beginning of the period).

43. "World 3" works with three different ways of taking age into account. Either no age division is made at all, or a division is made into 4 large age groups, or into 15 age groups. A certain improvement naturally ensues with age differentiation where measurement of natality and mortality is concerned. That the result, nevertheless, cannot be regarded as satisfactory must be attributed to the construction and technique of measure-

ment, the multiplier arrangement and the quantification of this. Noteworthy and sometimes strange effects are obtained by the use of a special discontinuity technique

44 The labour force is calculated in the model as 0.75 of the whole population between 15 and 65 years Actually, the labour force is not used as an integrated factor in a production function, but is included only secondarily in a "job sector" within the capital subsystem. The author's explanation of this is that as there has always been a labour surplus on the global level, the labour force then becomes negligible in comparison with capital generation This unrealistic outlook is coupled with the assumption that there are unlimited possibilities for migration on the earth No account is taken of the quality of labour This way of treating production—which, of course, becomes of vital importance for the whole global system—has been strongly criticized by P. A. Julien and Christopher Freeman in the Sussex report. [6]

45 With such a formulation of the economic system, of course, there can be little claim of ability to measure the labour force correctly A more realistic approach must naturally take account of the restricted mobility, or in some cases, immobility of the labour force and with it, in fact, of the whole population, together with its physical and mental "quality". This presupposes a distribution of the population by sex and age, as well as by marital status and family/household type, health conditions (delimitations due to morbidity and disabili-

model design for homogeneous populations/societies

46. In their comments on the "World 3" model, the Sussex group end the discussion of the population subsystem by stating· "The model is not really forecasting the most likely world population sizes. Rather, the population subsystem is a means of generating plausible population figures to use as input for the other subsystems, and, as such, could have been made much simpler."

47 This, in the opinion of the present writer, is like placing the cart before the horse. The alpha and the omega of the model ought to be the human factor in the system

48 From the demographic point of view, a detailed age distribution (5-year groups) is necessary, of course, and it should be extended to high ages. For the study of employment, differentiation should also be carried out by sex, furthermore, family/household structure should be included in a suitable way, so that unpaid female participation in working life could be taken into account in the model.

49. Further, for calculating the consumption of goods and services, an age differentiation of the population must be made, since most of the elements here are age-specific and, in part, strongly bound to sex and household Where services are concerned, these include infant and child care, educational organization, sick and health care, social welfare, old-age care and housing These, in turn, are important for the structure and composition of production and trade and business and non-industrial services, as well as for saving tendencies and capital formation and for the level and directions of investment

50 On this, the MIT report referred to in paragraph 25 states

"... we consider the exclusion of labour to be one of the least satisfactory simplifications of the global model, primarily because of the social implications of unemployment While inclusion of an explicit labour force and representation of the causes and consequences of unemployment are unlikely to change the basic behaviour modes of World 3, these additions would make the model much more relevant to studies of social welfare and political stability. Global unemployment is an immense problem today and is expected to worsen over the next several decades It would be useful to extend the model to include the causal mechanism in which unemployment is involved"

The International Labour Organisation "Bachue" models

51 A large-scale research project was begun at the International Labour Office in 1972, within the framework of the World Employment Programme of the International Labour Organisation (ILO) The final aim of this project, the over-all title of which is "Population and Unemployment", was stated to be to enable Governments, especially those of the developing countries, to take more effective account of population matters in employment policies and vice versa

52 The means of attaining this goal is to construct a model which would make it possible to analyse conditions and tendencies in the labour force and employment, as well as the principal phenomena and variables which influence them In other words, it is a question of a fairly general model in which, however, some phenomena will be given a less prominent role than in the MIT models.

53 The first stage of the development work has been carried on by Richard Blandy and René Wery, in consultation with experts from the Sussex group. The *model is based on the technique of systems analysis.* A detailed report has not yet been published, but the project's main properties have been presented in preliminary papers [7]

54. The ILO project, named after Bachue, the Colombian goddess of love, fertility and harmony between nature and man, consists of two parts. One part consists of research studies dealing with important

[6] *Ibid*, pp 66 79

[7] See R Blandy and R Wery, "Bachue-1, The dynamic economic demographic model of the population and ploy- ment project of the World Employment o ramm ter- *national Population Conference* vol 51 r- national Union for the Scientific ul

elements in the network of relations between population and employment behaviour. Parallel to these, efforts are being made to build quantitative simulation models reflecting this network. The initial concept of an economic-demographic system was first formulated in a model called Bachue-1. This is described as, first and foremost, a learning experience. The model is designed to represent a high-fertility developing economy. A number of countries have been engaged in working out specific applications, the first of which is Bachue-Philippines.

55. It is expected that the forthcoming experience from these country-models will serve as an important feedback in improving the theoretical structure of Bachue-1. In this way, the substantive studies will aid the process of successive revision of the model for understanding the population-employment problems in developing countries.

56. Since the Bachue models employ the systems analysis method, they can be said, in principle, to have a number of the advantages and deficiencies that have been quoted above in reference to the MIT models.

57. With regard to the effects of the strong aggregation, it may first be mentioned that these have been diminished somewhat, in part by limiting the aim and concentrating upon conditions only in the less developed part of the world, and in part by working, in certain variables, with a rather greater differentiation.

58. Both these circumstances, however, lead to other kinds of difficulty. Quantification can naturally only be done with data from countries where fairly reliable data are to be found. Here, data on Mexico have been used in preference, but data from a couple of other Latin American countries have also been used. This evidently gives a bias when it is a question of representing the whole of the less developed world. Nor is the difference in socio-economic structure given its due.

59. From the methodological aspect, difficulties arise in measuring and quantifying migration and other flows within the economic subsystem. An important advance in the Bachue models, however, is the way in which rural and urban sectors of population and economy are separated.

60. The prototype of the Bachue models consist of three sectors, the demographic subsystem, the educational subsystem and the economic subsystem.

61. Of the first it may be said that it includes the population by sex, age, location (rural/urban) and activity (employment or not). Mortality is indicated quite simply by means of the mean expectation of life, from which age-specific mortality rates are obtained with the aid of the United Nations model life-tables. [8] In its turn, the life expectancy is assumed to be dependent upon the average household income and to rise from the initial level of developing areas to a level corresponding to current conditions in the industrial countries.

62. As for the birth rate, the models work with two components, desired number of births and "uncertainty". The desired or planned number of births is assumed to be determined by means of the following "modifiers": child mortality (positive); average educational level of adults (negative); opportunities for women to work in modern sector jobs (negative); proportion of unpaid family workers in the labour force (positive); average educational level of children (negative); and average household income (negative).

63. This is a far more differentiated approach than that of the MIT model, "World 3". It carries with it, however, the risk of considerable accumulation of systematic errors as a result of difficulties in determining the interaction between influencing factors. Also, the quantification for a heterogeneous population/society seems difficult, risky and, in part, impossible, just as is the case with the MIT models.

64. By "uncertainty" is meant the effectiveness of family planning practice. This is assumed to depend, among other things, upon the educational level of adult females. One innovation is the introduction of a policy variable in the form of the rate of spread of modern contraceptive technology, which is assumed to be subject to governmental control. A further factor is the difference between rural and urban, which is taken into account through an assumption about migration.

65. A special method has been worked out for handling net migration from rural to urban sectors. Migration is based in the first place on the propensity of males in the working ages to migrate. The tendency to migrate is assumed to be affected by educational level, income and employment-related variables.

66. The presentation of the Bachue models contains a comprehensive, though not completely enlightening, discussion of labour force definitions in a society with both a traditional and a modern economic sector. The meaning is that previous models only took account of one-way causal connexions in the economic-demographic processes, while Bachue seeks to analyse economic-demographic interactions in a complex set of realities whose interconnectedness enhances the explicative value of the model. Further, Bachue-1 has three main distinguishing features:

(*a*) First, it is highly endogenous: fertility, mortality, rural-urban migration, schooling propensities, productivity, income distribution and consumption patterns—all respond endogenously to the behaviour of the system;

(*b*) Secondly, it involves a high level of disaggregation. Population is broken down by age-sex groups and activity status as in some earlier models; its simultaneous breakdown by rural-urban residence and levels of educational attainment is a novel feature. Similarly, the economy is disaggregated into a national accounts expenditure framework with an input-output matrix being

[8] *Age and Sex Patterns of Mortality, Model Life-tables for Under-developed Countries* (United Nations publication, Sales No. 1955.XIII.9).

ised to derive sectoral "value-added" and employment.

(c) Thirdly, it makes an explicit attempt to represent economic dualism (the coexistence of modern and traditional sectors) and to estimate the size distribution of personal income.

Simulations on Bachue-1 have shown that fertility reduction might be seen as one of the most crucial causes reducing economic dualism

67 The treatment of the educational subsystem is linked with a report published by the Organisation for Economic Co-operation and Development (OECD), [9] in which a division is made mainly according to the number of school years A system of feedback loops integrates education into the total system The combination of rural/urban distinctions implies a clear improvement as compared with other attempts at general and sectoral models

68 It is obvious that the Bachue model includes several factors and feedbacks which are missing in the model "World 3", in both the population and the economic sectors In addition, education is included

69 It is too early to review in this presentation the details of Bachue and to form an opinion of its value for various purposes. It would appear, however, that the successive improvements of the model through a planned dialogue between the basic model and the substantial country studies will make it possible to obtain a useful instrument for analysis and policy-making in the types of countries concerned. The quantification difficulties of parameters and linkages are, however, immense.

70. One step would be to combine the experiences and models thus obtained with a revised future version of the MIT model "World 3". This will not be an easy task, but it can be done It will, as a matter of fact, improve the Bachue model in fulfilling its own objectives, as well as help to produce a general model suited not only for developing countries, but for a variety of societies which are homogeneous with regard to demographic, social and other aspects.

71. It appears important and urgent that health conditions (acute illness, invalidization and inability to work) should be included explicitly in the model Special studies are being carried out to solve the methodology and assemble data for this extension by the World Health Organization and by research institutes.

Other selected models

72. There are a number of models and study projects to be found which are linked in limited respects with the theme of this report, that is, to the extent to which model methods can be used to obain an improved basis for decision about political measures.

[9] Organisation for Economic Co-operation and Development, *Sim A Simulation Model of the Educational System* (Paris, Centre for Educational Research and Innovation, 1970).

73 A number of projects are considerably older than the recent discussion on the future of mankind, while some studies have been directly inspired by the MIT models—often as a result of criticism of the latter Certain models are independent approaches using specific methods other than systems analysis

74 Although a number of econometric models have a general aim, they are, as a rule, greatly restricted with regard to the variables included, as well as the form and extent of the interrelations between the various phenomena and factors These models, therefore, do not answer to the definition of dynamic DESMOD. At the same time, however, it is clear that relatively simple models may at times, under specific conditions, make a contribution of direct value in the interpretation of a phenomenon They may thereby, in theory, also serve as a method in decision-making

75 Further mention should be made of a group of models which were not directly constructed to be instruments in decision-making, but only with the lesser ambition of giving a better picture of a phenomenon In the population sector there are thus to be found certain simulation models which, placed in a wider context, can serve as a means for the analysis of population-related social problems and even be included as a subsector in a general model (It should be emphasized that the models reported on in this section form but a small and unrepresentative selection, limited by the short time available for drawing up this report)

76. First, there is a type of model for demographic use which has played a large part, and still does, in planning in less developed countries where no precise information about mortality conditions is available Special model life-tables have been constructed by the United Nations, by the Office of Population Research at Princeton, and by other organizations From these sets of life-tables it is possible, if one or two estimates of the mortality level are available, to choose a suitable table for use in analysing and forecasting the population of a specific country. Suitable estimates might be, for example, one of infant or child mortality and one for an adult age-interval. This technique has played an important role in national planning in such areas. These model life-tables are also being used for other purposes, e g , as part of more general model approaches

77. Recently, efforts have been made to construct similar sets of tables for fertility. In this way, even the statistically less developed areas can analyse and forecast their demographic conditions for a period ahead As independent observed data become successively available these methods, of course, will lose their importance On the other hand, such tables serve a purpose in long-term analysis and in connexion with more general models They therefore constitute an important ingredient in the building up of general demographic-economic-social models.

78. In recent years, a number of different models have been worked out to simulate reproduction or certain components of it The pioneer effort

seem to have been made by G. Orcutt and his colleagues in 1961.[10] Later, various attempts followed, in part to work out more detailed models of fertility and in part to obtain general models of the whole reproductive process. Among all these models, a few may be touched on briefly here.

79. A deterministic model, called FERMOD, has been developed by R. Potter and J. Sakoda.[11] This has been used, among other things, for the analysis of fertility and family planning programmes. More exhaustive is the stochastic model, POPSIM, worked out at the Triangle Research Institute, Chapel Hill, North Carolina.[12] A modified form of this is that called REPSIM by M. Sheps and his colleagues.[13] Both these versions aim at relatively detailed descriptions of the reproduction of human populations. There have been a number of applications. Thus the models have been used not merely for analysing current reproductive conditions in various populations, but also for comparing different methods and policy projects with reference to birth control.

80. Simulation models of fertility in combination with nuptiality and mortality have been further developed at the Demographic Research Institute, University of Gothenburg.[14] Certain versions of these models deal with the conditions where birth control is absent, while other models have in view the conditions in a country where birth control is fully carried out. Various functions in birth control have been studied. The possibility of simulating the transition during different external circumstances has been arrived at by these means.

81. A research project at the Université Catholique de Louvain has been planned for a very comprehensive and detailed simulation model, the direct aim of which is to describe the course of transition from high and uncontrolled levels of mortality and fertility to low controlled levels and it can thereby answer the need of the developing countries to judge the course of events on different assumptions about the effectiveness of the control of mortality and fertility, respectively.

82. As an example of a model with a limited purpose, mention may be made of a project developed at the University of Chicago by Donald J. Bogue, Scott Edmonds and Elisabeth J. Bogue.[15] The project includes computerized applications to the setting of targets and quotas for family planning programmes.

83. Although the model is relatively simple in its scope, it has great flexibility. What is particularly important is that it can handle the dynamic process in time in all essential variables. Among these are counted not only fertility, mortality, migration and marital status, but questions of birth control, such as the effectiveness of the methods, the average time for use of preventive technique and the effectiveness of the actual use of different methods. If the latter factors are treated from a more general perspective, there is evidently a possibility of judging alternative methods in order to carry out birth control programmes in countries with different starting-points and varying objectives. To sum up, it may be said that a model of this sort can well fit in as a sector in a more general programme.

84. A number of research projects have been initiated as a consequence of the discussion and criticism that followed the publication of *The Limits to Growth* (see paragraphs 24-27). A couple of projects were begun even earlier. Some have developed their own methods for analysing the growth problems.

85. The diversity of these projects makes it impossible for the time being to find out what would be the integrated and co-ordinated knowledge available through all these studies. This is particularly the case as, with a few exceptions, only preliminary and incomplete progress reports have been published.

86. From the point of view of this report, it should also be observed that relatively few of the projects are designed for developing formal models which can serve as decision instruments in analysing and comparing different political measures. On the other hand, it is evident that a great many of the non-model studies contain observations and conclusions of high relevance and importance for the operating of models and thus for the ultimate formulation of policies.

87. Directly connected with the Club of Rome are the following:

(*a*) "Strategy for Survival", by R. Pestel and M. O. Mesarović,[16] the construction of a hierarchical model for policy decision, in which social, political and economic factors are taken into consideration;

[10] G. Orcutt and others, *Microanalysis of Socioeconomic Systems* (New York, Harper, 1961).

[11] R. Potter and J. Sakoda, "A computer model of family building based on expected values", *Demography*, vol. 3, No. 2 (1966), pp. 450-461.

[12] D. G. Horvitz and others, *POPSIM: A Demographic Microsimulation Model*, Monograph 12, Triangle Research Institute, Carolina Research Center (Chapel Hill, N. C., University of North Carolina, 1971).

[13] M. C. Sheps, "A review of models for population change", *Review of the International Statistical Institute* (The Hague), vol. 39, No. 2 (1971), pp. 185-196; J. C. Ridley and M. C. Sheps, "An analytic simultation model for human reproduction with demographic and biological components", *Population Studies*, vol. XIX (1966), pp. 297-310.

[14] The results are reported in the series of the Demographic Research Institute, Gothenburg: H. Hyrenius and I. Adolfsson, *A Fertility Simulation Model* (DM 1), Report 2 (1964); H. Hyrenius, I. Adolfsson and I. Holmberg, *Demographic Models* (DM 2), Report 4 (1966); H. Hyrenius, I. Holmberg and M. Carlsson, *Demographic Models* (DM 3), Report 5 (1967); I. Holmberg, *Demographic Models* (DM 4), Report 8 (1969); I. Holmberg, *Fecundity, Fertility and Family Planning: Application of Demographic Micromodules*, I Report 10 (1970), II Report 11 (1972).

[15] D. J. Bogue, S. Edmonds and E. J. Bogue, "An empirical model for demographic evaluation of the impact of contraception and marital status on birth rates", Community and Family Center, *Manual 6* (Chicago, Ill., University of Chicago, 1973).

[16] M. Mesarović and others, *Construction of a Dynamic Model of the Regionalized World Economic System* (Cleveland, Ohio, Case Western Reserve University; and Hannover, Technische Universität and Medizinische Hochschule, 1972).

(*b*) A very comprehensive modification and development of the so-called "Delphi" technique (DEMATEL),[17] by the Battelle Institute at Geneva, in which the various elements of the problems of growth, as they are understood by decision-makers in different parts of the world, are weighed together by a special technique and reciprocal connexions are quantified to the extent possible;

(*c*) A broadly planned study at a number of institutions,[18] initiated by the Japan Work Team of the Club of Rome, all of which are working partially on the problems of growth in welfare States and partially on Japan's future role in the world

88. In Latin America, a large project has been initiated in order to develop a separate world model, with its starting-point especially from the situation and valuations of the developing countries [19] A number of Latin American countries are taking part in this, under the leadership of A G Herrera The work begins with a critical analysis of the MIT model, after which the authors design their own model Growth hypotheses have been developed and efforts are being made to estimate the possibilities of development for the less developed countries over a period of 30-35 years ahead The prospects of economic equalization between rich and poor countries are judged, among other things, in the light of the consequences for the environment

89 A project of a special nature is "Population Doubling Problems", under the direction of H Linnemann, with J Tinbergen as adviser.[20] This is not primarily a systematic model construction, but an analysis of necessary programmes and decisions which must be taken now, if some of the most difficult problems of resources under a doubled world population are to be mastered

Conclusions

90 The extensive criticism to which certain model experiments have been exposed from seriously engaged scientists and technicians, as well as from generally interested but less expert persons and representatives of mass media, has not been merely negative. A number of constructive points of view and suggestions have been put forward Some of these have resulted in projects designed to improve, in certain points or subsectors, what has already been published Furthermore, completely new ideas and methods have been launched for investigating future development

91 The present paper gives an account of a study of a number of models already described in some degree, as well as of a limited number of critical reviews of such models It should be emphasized that the selection of material is strongly affected by what was actually available during a short period up to the end of 1973

92. This study gives the investigator grounds for the following concluding statements The points of view and proposals are entirely the investigator's own

93 The models and methods worked out so far, as well as the different tasks of expansion and improvement of these which are now going on, are not yet of a nature and capacity to enable them to function as instruments in a deeper analysis of demographic-economic-social problems For this reason, they cannot currently contribute in any appreciable degree to improving the grounds for decision in the formulation and carrying through of political measures in these areas. They cannot replace parts of current investigation procedure.

94 The development of a general model which, in all essentials, reflects the condition and change factors in population and society is only a first step *A priori*, one can think of the model as a closed system with its various internal interrelations The model does not become of practical interest, however, unless it is possible to express the influence of exogenous variables upon the central phenomena It is only under these conditions that one can expect, through model-building, to arrive at instruments for analysing the effects of alternative measures in the demographic, economic, social and cultural fields Since the models are by nature mainly built up on quantitative variables, numerical forms must be found for the relations that are to express the effects of the measures taken These relations may take the form of tables, curves or mathematical functions with sets of parameters An example of this is the introduction of a policy variable into Bachue for the study of government activities in family planning

95 The work with general models must be specially directed towards producing such policy relations To the extent that quantification cannot be carried out, the possibility exists of working with different sets of parameters for alternative forms of measures and alternative effect phenomena

96 Although the models now available and the projects now under way may appear insufficient as instruments in analysing and comparing alternative policy measures, they may, with somewhat less ambition, be used for what could be termed process-control of the society. This would meet the marked need for evaluating the outcome of ordinary forecasts and projections of populations Such evaluations have so far been made with rudimentary tools, while a realistic interpretation necessitates a systems approach, incorporating natural resources, labour force, capital, structure of the economic machinery, consumption patterns, social factors, environmental effects etc. Using models, whether general or sectoral, in such ways would serve as an alarm system, indicating when any one phenomenon devia more than what is considered acceptable al

[17] *First Year Status Report on DEMATEL and Continuation Proposals for 1973* (Geneva, Battelle Institute for Science and Human Affairs, 1972)

[18] Y Kaya, *The Activity of Japan Work Team of the Club of Rome* (Tokyo, Japan Techno-Economics Society, 1973)

[19] "The first alternative World Model", in *Latin American World Model* (Buenos Aires, Bariloche Foundation, 1973)

[20] International Bank for Reconstruction and Development, *Report of the Limits to Growth A Study by a Special Task Force of the World Bank* (Washington, D C, 1972), annex F

need for policy actions could thereby be shown at a suitable time in advance.

97. Research and further development in this highly technical field requires extensive resources and the co-operation of scientists from many different disciplines. What has been achieved so far has been obtained in part through occasionally organized activities at a few large research institutes and through *ad hoc* research teams. Valuable contributions have also been made, however, by small institutes and by individual scientists.

98. For promoting further development research, it appears necessary to make arrangements for co-ordinating already existing projects and initiating research on "gaps" in the research frontiers.

99. It is necessary, furthermore, to provide guarantees that continued financial resources will be available for all subprojects needed. Otherwise, lack of financial resources leads to bias and distortion of research efforts and underemployment of the existing research staff with its valuable knowledge.

100. It would appear that these tasks should, in the first place, be taken care of by the United Nations and those of its special agencies which are most concerned (the International Labour Organisation, the World Health Organisation and the United Nations Educational, Scientific and Cultural Organization). Different forms of organizations are possible, of course.

101. It appears to be highly desirable that already existing research projects at universities and other research organizations should be co-ordinated in order to give maximum use of research staff and financial resources. A possible co-ordinating agency would be the Committee for International Co-ordination of National Research in Demography (CICRED).

102. Regardless of the way in which the continuation of the work is organized and carried on, the formulation, applications and quantifications of the models must be applied to strata (regions, type of society) which are, as far as possible, homogeneous in essential respects.

ECONOMIC-DEMOGRAPHIC MODELLING ACTIVITIES OF THE WORLD EMPLOYMENT PROGRAMME *

International Labour Office

1 In 1972, a large-scale research project on population and employment interactions was initiated by the International Labour Organisation (ILO) with funds from the United Nations Fund for Population Activities (UNFPA) and within the general framework of the World Employment Programme This project currently consists of two interrelated activities a series of research studies dealing with important elements in the network of relations connecting population and employment behaviour, and an effort to build a series of quantitative simulation models

2 The series of economic-demographic models is called Bachue, named for the goddess of love, fertility and harmony between nature and man in Colombian mythology The intent of this modelling exercise is to provide Governments in developing countries with either specific country models which can be used to take more effective account of population matters in employment policies, or an analytical framework which can be adapted by Governments in building their own policy-oriented economic-demographic models

3 After Bachue-1, the Bachue series will consist of country-specific models However, to ensure some degree of homogeneity among these country-specific models, it was decided to build Bachue-1 (the first model in the Bachue series) as an experimental simulation exercise It was in Bachue-1 that the initial concept of an economic-demographic system was first put on paper

4 Bachue-1 will be used as a general model after which the country-specific models will be patterned Bachue-1 has three main characteristics distinguishing it from its impressive number of predecessors, which have been developed in various places over the past 15 years. First, it is highly disaggregated population is distributed by age and sex between urban and rural areas and by educational attainment, and economic activities are disaggregated into a full, national-accounts expenditure framework coupled with an input-output matrix to derive production, employment and value-added by sectors Secondly, Bachue-1 has two structural features which distinguish it, an explicit attempt to introduce economic dualism, and an explicit attempt to estimate the behaviour of the size distribution of personal incomes Thirdly, the degree of endogeneity in Bachue-1 is very high rural-urban migration rates, fertility and mortality rates, schooling propensities, productivity growth, and the pattern of final demands all respond endogenously to the behaviour of the model

5 Bachue-1 can be considered foremost as a learning experience from the point of view of computer modelling and as a testing-ground of the relevant existing literature on demographic-economic interactions It was during this specification of Bachue-1 that gaps in the base of demographic-economic interactions became evident In that sense, Bachue-1 proved useful in identifying areas in which theoretical or empirical knowledge was limited and in which further research was necessary

6 Bachue-2, the second model of the Bachue series, is currently under way It is applied to the Philippines for the following reasons First, because a consistency input-output employment model for the Philippines is being developed by Erik Thorbecke in connexion with the ILO comprehensive employment mission which was sent to the Philippines in the summer of 1973 It is clear that this economic model could become the base of the economic system in the formulation of Bachue-Philippines Secondly, there is a large body of secondary data which can be used to specify empirically many relationships appearing in the Bachue-1 framework The completion of the Bachue-2 is planned for the autumn of 1975 Some features of Bachue-2-Philippines are presented under the heading Bachue-2

7. Bachue-3 is being applied to a country in Latin America and Bachue-4 to a country in Africa. From experience gained in data collection in the Philippines, it is considered that access to primary data is of vital importance in the formulation of a comprehensive economic-demographic model In some cases, specific surveys should be conducted to obtain more information on the interactions between demographic and economic and sociological phenomena It is hoped that this type of information could be incorporated into Bachue-3 and -4, which are scheduled to be completed by the end of 1976

8. At the same time that country-specific models are being built, work is continuing in improving t s cification of the prototype Bachue-1 onsis revi-

* The original text of this paper was submitted as E/CONF 60/SYM I/17 to the Symposium on Population and Development, Cairo 4-14 June 1973, and as E/CONF 60/SYM III/16 to the Symposium on Population, Resources and Environment, Stockholm, 26 September 5 October 1973

sion of the framework on the basis of the experience gained in country-specific Bachue models; results from substantive studies in developing countries undertaken under the auspices of the Population Employment Project; and outcome of the other research activities of the World Employment Programme (research on income distribution, technologies, education etc.). It is clear that improvements in certain aspects of the model are necessary. In particular, more policy instruments should be identified and their effects on economic and demographic behaviour quantified, in order to increase the operational usefulness of the model.

9. Furthermore, the computer language used in specifying Bachue-1 is being simplified. At first, it was programmed in Dynamo language, which is based on System Dynamics.[1] Whereas there were important advantages in using Dynamo in the original version of Bachue, the disadvantages in terms of extremely large core usage, difficulty in adapting it to computers available to the developing countries and others, convinced the developers that the model should be rewritten in Fortran language.

10. It is hoped that the country-specific versions of Bachue will be of some use to policy-makers.

BACHUE-1: THE PROTOTYPE FRAMEWORK

11. Bachue-1 is a very ambitious undertaking representing the complexities and structural characteristics of developing countries. For this a price has been paid in that knowledge of the quantitative dimensions of behavioural relations in the developing countries is very meagre. Even the qualititive dimensions are not well understood. Bachue-1 is not a representation of any particular country, but a representation of an archetypal developing country in Latin America. It is based on theoretical relations quantified in published research, regression analysis, expert judgement and intuition about Latin American countries.

12. Hence, no empirical interpretation should be given to Bachue-1. The parameters of the theoretical framework were done, using facilities offered by the Dynamo language, to achieve plausible results. Simulation of the model was done under various hypotheses to achieve a feeling for the sensitivity and importance of various parameters.

13. Bachue-1 is comprised of three general subsystems:

(*a*) A demographic subsystem including rural-urban migration;

(*b*) An education subsystem;

(*c*) An economic subsystem.

[1] System Dynamics and Dynamo are attributable to the pioneering work of Jay W. Forrester and others at the Massachusetts Institute of Technology (Cambridge, Mass., United States of America). Dynamo offers some remarkable facilities, including the ease with which non-linearities can be handled, the clarity of its error messages and the irrelevance of programme ordering.

14. A detailed description of the model is not give here. An algebraic formulation of the economic sul system can be found in annex I. A chart showing th main feedback effects in the model is shown in annex I What follows is a brief description.

The demographic subsystem

15. The demographic subsystem consists of a set c accounting identities which trace cohorts of populatio by five-year age groups, rural-urban location and se throughout their lives, and a set of behavioural equa tions which determine births, deaths, migrations an labour-force participation (see annex I). People ar born (male or female in urban or rural areas). The either become old or die. If they become older the either migrate from rural to urban areas or they do not They are either in the labour force or they are not. I the end, they all die. By means of this accountin system, one can trace at each point of time the age/sex/ location/labour-force composition of the population, a well as its total size. Behavioural variables classified b age/sex/location in this subsystem are births, deaths migration and labour-force participation.

Births

16. In the model, births each year are a function of the average actual number of births that fertile women are likely to have over their lives (by urban and rural areas). This actual lifetime number of births (for rural and urban areas each) is made up of two components—a planned number of births and "uncertainty". The explanation of the planned number of births is based on the two theories presenting children as an investment good and as a durable consumer good. Explanatory variables retained are mortality rates, average educational level of adults and of children, opportunities for women to work in the modern sector, proportion of unpaid family workers in the labour force and the average household income.

17. "Uncertainty" reflects the degree of effectiveness of family planning practices. It is assumed that without modern contraceptive technology it is not possible to reduce the lifetime average number of births per woman except with a very long delay in marriage. It is also assumed that the average educational level of females influences the effectiveness of birth control.

18. Lastly, a policy variable in the form of a rate of spread of modern contraceptive technology has been introduced. Modern contraceptive technology is assumed to permit families to eliminate "uncertainty" and to achieve their planned number of births.

19. In addition, because of rural-urban migration, it is assumed that migrants bring with them rural birth-behaviour, which is adapted over a five-year period to the prevailing urban (non-migrant) pattern.

20. Lifetime expected numbers of births are then transformed in the model into annual age-specific birth rates.

Deaths

21. Life expectancies by sex/location are assumed to increase slowly as average household incomes increase, reaching developed-country life expectancies at high household-income levels. A slightly longer urban than rural life expectancy was also assumed. Life expectancies are then transformed in the model into annual age/sex/location-specific death rates.

Net rural-urban migration

22 Net rural-urban migration in the model depends upon the migration of working-age males The propensity to migrate is a function of four variables (1) the rate of growth of modern-sector urban jobs, (2) the ratio of rural to urban household income, (3) the average educational level of working-age rural males, and (4) a weighting factor (derived from the gravity model of migration) which adjusts the rate of migration obtained from the other variables

23 Migration rates by age and sex are obtained by multiplying the migration rate for working-age males by ratios representing the proportions that the age/sex migration rates form to the rate for working-age males

Labour force

24 The determination of labour-force size and composition is one of the main areas of the model on which much more development is needed There are many difficulties with the concept of labour force as applied to the developing countries which are well known For instance, because of the importance of the family unit as a production entity in the developing countries, it is often difficult to distinguish "market" work from "home" work or even "work" from "leisure" activities

25 At this stage of development of Bachue-1, the labour force has been calculated by the simple expedient of multiplying each age/sex/location group of the population by age/sex/location-specific labour force participation rates

The education subsystem

26 The education subsystem again consists of a set of accounting identities which divide the population into those who are in the education system and those who are not, and which trace the respective subcohorts of population through their lives

27 Each five-year age/sex/location-cohort of population can then be classified according to the highest level of education completed (and according to the level of education in which they are currently enrolled for those age groups attending school).

28 The behavioural equations determining the development of these educational characteristics of the population concern death and migration rates, and enrolment and drop-out rates. It was assumed that there was no difference in death or migration rates between those in school and those outside school. Enrolment and drop-out rates in primary, secondary and tertiary education are related to household income levels.

The economic subsystem

29. The economic subsystem consists of a general equilibrium, input-output consistency model with supply constraints [2] The most novel features of the subsystem are an explicit recognition of "traditional" [3] production sectors and the derivation of a distribution of household income by size of income. Beginning with final demand for domestic production by production sectors, sector output levels are computed Sectoral value-added is derived from the gross output levels; and, lastly, sectoral employment is calculated on the basis of the sectoral value-added and estimates of labour productivity The employment and production levels for each sector form the basis for estimates of household income distribution The income of these groups is either taxed away, saved or consumed—completing the circular flow of income and production

Final demand

30 Final demand for domestic production consists of the sum of consumption by urban and rural household groups defined according to size of income plus investment by households, enterprises and government plus government consumption plus exports minus final imports demanded Each of these components of final demand is distributed over the productive sectors of the economy.

31 Household consumption is a function of household income and household characteristics in terms of the number and age of its members.

32 Three sources of demand for investment goods are identified. household, government, and enterprises Demand for investment from household and government is assumed to respond to such demographic factors as number of households, urbanization and population growth All sources of investment respond to the usual economic variables, such as household income, growth rate of gross domestic product In turn, a link is assumed between investment demand and capital formation by sector which appears in the final demand

33. Government consumption is a function of growth in government revenues, growth in total population and growth in the urban proportion of population.

34 Exports from each production sector are assumed to grow at various constant exogenous rates

[2] Investment is a function of value-added in the previous period Since the economic subsystem is essentially an input output model this relationship is demand-oriented Increase in demand for investment is always supplied To ensure that investment shall be sufficient to generate the increase in output supply constraints are built in The supply constraints are sectoral incremental capital-output ratios. Increase in sectoral production or output is matched with the increment in capacity A convergence to the condition of output equals capacity is obtained by adjustments on final demand The final demand vector is reduced when there is no excess capacity and vice versa

[3] Traditional sectors are defined as those having the ability to absorb surplus labour, see paras. 36 39

Short-term fluctuations are permitted, resulting from the level of foreign reserves available.

35. Imports are computed as proportions of each vector of final demand and deducted from those vectors to leave final demand for domestic production. These proportions depend upon the availability of foreign exchange reserves.

Output and value added

36. Output from each sector is calculated by pre-multiplying the net final demand by the inverse input-output matrix. The input-output matrix is assumed to remain constant throughout the simulation. However, as the allocation of final demand changes between modern and traditional sectors producing the same good, this amounts to a change in the aggregate technical coefficients of productive sectors—giving more weight to modern techniques of production. It should be emphasized that this is merely a computational convenience to simulate technical progress.

37. Primary inputs, including intermediate imports, are calculated as proportions of gross output levels. Values added, corresponding to the primary distribution of income to households or personal income, are calculated from gross sector output levels, again by assuming fixed proportions. Lastly, base-period values-added were allocated between rural and urban areas according to the judgement of the research team and its judgement of productivity levels in the sectors between rural and urban areas, and a constraint that employment in rural and urban areas should be equal to the respective labour forces. Over time, rural value-added in the modern sector is assumed to grow at the same rate as value added in modern agriculture, and rural value-added in the traditional sector is assumed to grow at the same rate as value added in traditional agriculture. Value added in modern and traditional urban sectors grows as the residual between total value-added and rural value-added for that sector.

Employment and productivity

38. Employment in each of the modern sectors is calculated by dividing value added by labour productivity. Growth in labour productivity is a function of labour availability, the average growth of educational level of the working-age population and growth in enterprise investment. If the labour force grows very fast in relation to value added in the modern sector, it is possible for increasing under-employment in traditional activities to occur.

39. Employment in each of the traditional sectors is treated as a fixed proportion of the labour force supplied to the traditional sectors, which is calculated as the difference between total labour force and labour force employed in the modern sectors. The traditional sectors are, therefore, treated as "sponge" sectors capable of absorbing those who cannot find employment in the modern sectors. Hence, there is no unemployment, only under-employment in the model, which conforms to the "unlimited supplies of labour" or dualistic model of economic development.

Household income distribution

40. One of the central features of this model is its explicit attempt to estimate changes in the size-distribution of income of households.

41. The main assumption underlying the income-distributing mechanisms of the model is lognormality. For each sector, rural and urban, the distribution of value added to individuals—including both profits and wages—is assumed to be approximately lognormal. In addition, for lack of suitable data, household dependency is assumed to be independent of income, which means that the distribution of value added is directly proportional to the distribution of income to households. This assumption allows a simplified income-distributing mechanism to be evolved.

42. Taking a single household size and a constant number of actives per household, although convenient assumptions, are obviously over-simplifications which need further development. One step that will be easily introduced would be to incorporate a distribution of household sizes, maintaining constant labour force participation ratios. A correlation between household size and household income could also be imposed. Since the incomes of workers other than the household head (particularly of women) will, in general, have a different distribution from that of the head, it is arguable that a more complex distribution of sectoral income to different types of worker should be evolved and related to age/sex-specific participation rates.

43. A serious complication arises when household income originates from more than one sector. It might be possible to establish a sectoral classification to minimize this problem for a point in time, but development over time is likely to shift the sectoral allocation of household actives and so would require continuous reclassification. To take non-wage and wage incomes simultaneously into account may involve another problem.

BACHUE-2: PHILIPPINES MODEL

44. Bachue-Philippines is the first application of the Bachue prototype model to a specific country. The economic subsystem to be used in Bachue-Philippines is based on the intersectoral consistency model which is being built under the supervision of Erik Thorbecke, with the help of the Bachue team, to be used in connexion with the ILO comprehensive employment mission to the Philippines.

45. A number of modifications will be introduced in the economic subsystem of Bachue-Philippines, compared with that of Bachue-1. The purpose of these modifications is to increase the operational usefulness of the model and to improve the empirical basis of many of the relationships.

46 The heart of the economic subsystem is the large input-output table which was built by the National Economic Council for 1965, using a 194-sector breakdown This table is currently being consolidated into a 13-sector breakdown which is to be used in the economic subsystem The essential feature of the sector classification used in Bachue-Philippines is that it distinguishes not only between productive sectors, but along technological lines, i e, whether the technique of production is "modern" or "traditional". Thus, a certain number of sectors, such as consumer goods, trade, transport and communication, services and agriculture, are subdivided into a modern and traditional part The criteria that were used in identifying sectors as traditional or modern are: the ratio of self-employed workers and unpaid family workers to total employment, and the average number of workers per establishment

47. When the model is used for projections and/or simulation purposes, the system is moved through projected changes in the sectoral final demand components Thus, this procedure entails a number of important steps

(*a*) Sectoral consumption functions have to be estimated from household budget surveys In general, these consumption functions will be estimated for groups of products which can then be aggregated to correspond to the sector The form of these consumption functions will have to be such that they take into account not only demographic changes, but changes in income *per capita* and in income distribution,

(*b*) Sectoral exports will be estimated on the basis of the best information available concerning prospects abroad, likely price and terms of trade trends etc.,

(*c*) Since all imports in the National Economic Council table are treated as competitive, it will be necessary to measure the requirements for intermediate imports as opposed to truly competitive imports,

(*d*) Sectoral capital formation will have to be estimated in a way consistent with the investment demand necessary to produce the output This can be done by using a transformation matrix from investment by sector of origin to sector of destination.

48 After these various components of final demand (consumption, exports, imports and capital formation) have been projected, the next step is to derive the corresponding sectoral gross output and value-added magnitudes using the input-output matrix broken down along modern and traditional lines, as described above. Furthermore, on the basis of a more thorough labour market sub-system, currently being developed, the sectoral employment and income distribution can also be obtained. On the basis of a methodology that has already been tested, the personal income distribution resulting from the sectoral distribution can be mapped. At that stage, it could be determined whether the changes in the composition of output and employment would affect household distribution

49. It is clear that an important advantage of this type of model is that it can predict, within a consistent framework, the likely changes in the level and composition of both employment and value added and the corresponding income distribution Since many of the demographic variables are influenced by the latter, it makes it possible to improve upon the tenuous formulation which has characterized many attempts at relating changes in income distribution to some of the demographic variables It is expected that a first version of the economic subsystem of Bachue-Philippines will be available at the end of 1973

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ANNEX I

Bachue-1: economic subsystem

Subscripts used

1. Let $i = 1, 2, \ldots, 7$ denotes commodity classes.

For $i = 1$ Agriculture
$i = 2$ Consumer goods
$i = 3$ Capital goods
$i = 4$ Construction
$i = 5$ Trade
$i = 6$ Transport
$i = 7$ Services

2. Let $\alpha = M, T$ denotes a modern traditional classification of sectors

   ∴ each economic sector could be denoted as α_i;

   e.g., M_6 = modern transportation

   For $\alpha = M \quad i = 1, 2, \ldots, 7$

   $\alpha = T \quad i = 1, 2, 5$

3. Let $j = 1, 2, 3, 4$ denotes income classes

4. Let $\gamma = U, R$ denotes an urban-rural regional classification.

   . household income classes are denoted by γ_j,

   e.g., U_2 = urban households in income class 2

   For $\gamma = U, \quad j = 1, 2, 3, 4$

   $\gamma = R, \quad j = 1, 2$

5. Let $\bar{\gamma}_j$ denote the upper income limit of households in class γ_j, then

$$\bar{U}_1 < \bar{U}_2 < \bar{U}_3 < \bar{U}_4$$
$$\bar{R}_1 < \bar{R}_2$$

6. Let $k = 1, 2, \ldots, 13$ denotes age cohorts of population, then age group in a region could be denoted by γ_k.

   e.g., P_{γ_k} = population in region γ (urban or rural) in age group k

Household consumption

$$C_{i,\gamma_j}(t) = f\,(Y_{\gamma_j}(t-1),\, m_{i,\gamma}(t),\, b_{i,\gamma_j},\, \gamma(t)) \qquad (1)$$

where $C_{i,\gamma_j}(t)$ = consumption of good i by households in class γ_j;

$Y_{\gamma_j}(t)$ = total disposable income of households in class γ_j;

b_{i,γ_j} = income elasticity of good i with respect to income class γ_j;

$m_{i,\gamma}(t)$ = equivalent adults per household in region γ, with respect to commodity i;

ψ = a measure of economies of scale in consumption of good i.

$$m_{i,\gamma}(t) = \sum_{k=1}^{13} \theta_{ik}\, P_{\gamma_k}(t)/H_\gamma(t) \qquad (2)$$

where $P_{\gamma_k}(t)$ = number of heads (females plus males) in region γ in age cohort k;

θ_{ik} = number of adult equivalents in consumption of good i per person in age cohort k;

$H_\gamma(t)$ = number of households in region γ.

$$T'_M(t) = \sum_{i=1}^{7} h_i \left(\sum_\gamma \sum_j C_{i,\gamma_j}(t) d_{i,\gamma_j} \right) \qquad (3)$$

where $T'_M(t)$ = taxes on imported consumption goods;

d_{i,γ_j} = proportion of consumption imported (good i, household γ_j);

h_i = import tax rate on consumption good i.

$$M^c(t) = \sum_{i=1}^{7} (1-h_i) \left(\sum_\gamma \sum_j C_{i,\gamma_j}(t) d_{i,\gamma_j} \right) \qquad (4)$$

where $M^c(t)$ = imported consumption goods (at world prices)

$$PC_{M_i}(t) = \sum_\gamma \sum_j C_{i,\gamma_j}(1-d_{i,\gamma_j}) Z_{i,\gamma_j} \qquad (5)$$

where $PC_{M_i}(t)$ = final consumption directed at moder[n] sector i;

Z_{i,γ_j} = proportion of domestic demand of good [i] by household γ_j directed at the moder[n] sector

Note Z_{i,γ_j} = 1 for i = 3, 4, 6, 7.

$$PC_{T_i}(t) = \sum_\gamma \sum_j C_{i,\gamma_j}(1-d_{i,\gamma_j})\,(1-Z_{i,\gamma_j}) \qquad (6)$$

where $PC_{T_i}(t)$ = final consumption directed at the tradi-tional sector i

Government consumption

Government consumption is determined by the followin[g] differential equation

$$\frac{d \ln GC(t)}{dt} = \frac{d \ln Y_g(t)}{dt} + f \left(\frac{d \ln (P_u(t)/P(t))}{dt} \right) + 0.85 \left(\frac{d \ln P(t)}{dt} \right) + r_{ge} \qquad (7)$$

where $GC(t)$ = government consumption,

$P_u(t)$ = urban population,

$P(t)$ = total population,

r_{ge} = an exogenous (autonomous) growth factor

$Y_g(t)$ = government income;

$$GC(t) = GC(0) + \int_0^t \frac{d\,GC(s)}{ds}\, ds$$

$$GC_{\alpha_i}(t) = g_{\alpha_i} \cdot GC(t) \qquad (8)$$

(a) where $GC_{\alpha_i}(t)$ is government consumption directed a[t] sector α_i,

(b) $GW_\gamma(t) = W_\gamma\, GC(t)$

where $GW_\gamma(t)$ is governments wages paid in region γ.

and $\sum_\alpha \sum_i g_{\alpha_i} + \sum_\gamma W_\gamma = 1$

Exports

$$\bar{E}(t) = \sum_\alpha \sum_i \bar{E}_{\alpha_i}(0)\, e^{r_{\alpha_i}(t)} \qquad (9)$$

where $\bar{E}_{\alpha_i}(t)$ = export from sector α_i,

r_{α_i} = the growth rate of export from sector α_i

Investments

$$I_h(t) = f\left(\frac{d\,Y_p(t)}{dt},\ \frac{d\,H(t)}{dt},\ Y_p(t),\ H(t) \right) \qquad (10)$$

where $I_h(t)$ = gross household investments (i.e., dwellings);

$Y_p(t)$ = total disposable income;

$H(t)$ = number of households

$$I_g(t) = f\left(\frac{d\,TVA(t)}{dt},\ TVA(t) \right) \qquad (11)$$

where $I_p(t)$ = gross private investments (excluding housing);

$TVA(t)$ = total value added.

$$I_g(t) = f\left(\frac{d\ TVA(t)}{dt},\ TVA(t), \frac{d\ P(t)}{dt},\ P(t),\ r_s\right) \quad (12)$$

where $I_g(t)$ = gross government investment;

r_s = an exogenous growth factor.

$$M^I(t) = I_p(t) \cdot \theta_p \left(\frac{d \ln X_3}{dt}\right) \cdot (1-\rho_p)$$
$$+ I_g(t) \cdot \theta_g \left(\frac{d \ln X_3}{dt}\right) \quad (13)$$

where $M^I(t)$ = capital goods imported at world prices;

θ_p, θ_g = the proportion of gross investment imported;

ρ_p = import tax-rate on capital goods;

X_3 = gross output of the capital goods sector.

$$T^I_M(t) = I_p(t) \cdot \theta_p \left(\frac{d \ln X_3}{dt}\right) \rho_p \quad (14)$$

where $T^I_M(t)$ = taxes on capital goods imported.

$$I_{p_{\alpha_i}}(t) = I_p(t) \cdot (1 - \theta_p)\left(\frac{d \ln X_3}{dt}\right) \beta_{\alpha_i}$$
$$I_{g_{\alpha_i}}(t) = I_g(t) \cdot (1 - \theta_g)\left(\frac{d \ln X_3}{dt}\right) \gamma_{\alpha_i} \quad (15)$$

where β_{α_i}, γ_{α_i} are allocation factors of $I_p(t)$ and $I_g(t)$ to various sectors.

Similarly, $I_{h\alpha_i}(t) = I_h(t)\ \dot{\gamma}_{\alpha_i}$

Final demand

$$FD_{\alpha_i}(t) = PC_{\alpha_i}(t) + GC_{\alpha_i}(t) + \tilde{E}_{\alpha_i}(t)$$
$$+ I_{h_{\alpha_i}}(t) + I_{p_{\alpha_i}}(t) + I_{g_{\alpha_i}}(t) \quad (16)$$

where FD_{α_i} = final demand of sector α_i.

$$TFD(t) = \sum_{\alpha}\sum_{i} FD_{\alpha_i}(t) \quad (17)$$

where $TFD(t)$ = total final demand.

$$\text{Let } F = \begin{vmatrix} FD_{M_1} \\ / \\ \cdot \\ \cdot \\ \cdot \\ FD_{M_7} \\ FD_{T_1} \\ FD_{T_2} \\ FD_{T_5} \end{vmatrix} \qquad X = \begin{vmatrix} X_{M_1} \\ / \\ \cdot \\ \cdot \\ \cdot \\ X_{M_7} \\ X_{T_1} \\ X_{T_2} \\ X_{T_5} \end{vmatrix} \quad (18)$$

Then

$$X(t) = (I-A)^{-1} F(t) \quad (19)$$

where $X(t)$ = vector of gross output;

$F(t)$ = vector of final demand;

A = matrix of technical coefficients.

Value added

$$V(t) = \hat{V}X(t) \quad (20)$$

where $\hat{V}$ = a diagonal matrix of proportions of value added to gross output;

$V(t)$ = the vector of value added.

$$V(t) = V_u(t) + V_r(t) \quad (21)$$

where $V_\gamma(t)$ is the vector of value added in region γ.

$$\text{Let } V_r(t) = \begin{vmatrix} V_{M_{\cdot r}}(t) \\ V_{T_{\cdot r}}(t) \end{vmatrix}$$ where M, T denote modern and traditional sectors respectively.

$$V_{M_{\cdot r}}(t) = \xi_M \cdot V_{M_{\cdot 1}}(t)$$
$$V_{T_{\cdot r}}(t) = \xi_T \cdot V_{T_{\cdot 1}}(t) \quad (22)$$

where ξ_M, ξ_T are vectors of proportions determined at $t = 0$;

$$\text{e.g., } \xi_M = \begin{vmatrix} V_{M_1}(0)/V_{M_1}(0) \\ V_{M_2}(0)/V_{M_1}(0) \\ \cdot \\ \cdot \\ \cdot \\ V_{M_7}(0)/V_{M_1}(0) \end{vmatrix}$$

$$\xi_T = \begin{vmatrix} V_{T_1}(0) \\ V_{T_2}(0) \\ V_{T_5}(0) \end{vmatrix} \quad \frac{1}{V_{T_2}(0)}$$

$$VA_\gamma(t) = \sum_i \sum_\alpha V_{\alpha_i}(t) + GW_\gamma \quad (23)$$

where $VA_\gamma(t)$ = value added in region γ;

GW_γ = *government wages paid in region* γ.

$$D(t) = \omega' X(t) \quad (24)$$

where $D(t)$ = capital depreciation;

ω = vector of depreciation rates.

$$T_{id}(t) = \tau' X(t) \quad (25)$$

where $T_{id}(t)$ is total indirect taxes on sectors;

τ = vector of indirect tax rates.

$$M^{IN}(t) = (1-s_{IN})\ \phi'\ X(t) \quad (26)$$

where $M^{IN}(t)$ is imports of intermediate inputs at world prices;

$t_{I\backslash}$ is the import tax rate on intermediate inputs,

ϕ = vector of import coefficients.

$$IN_g(t) = \psi' X(t) \qquad (27)$$

where IN_g is input of government output into sectors

$$TVA(t) = \sum_{\gamma} VA_{\gamma}(t) + D(t) \qquad (28)$$

$$T_{I\backslash}(t) = t_{I\backslash}\ \phi'\ X(t) \qquad (29)$$

where $T_{I\backslash}(t)$ is import taxes on intermediate inputs

Employment (modern) sectors

Let $E_{\alpha_i,\gamma}$ denote employment in sector α_i in region γ, then

$$E_{M_i,\gamma}(t) = \frac{V_{M_i,\gamma}(t)}{l_{M_i,\gamma}(t)} \qquad i = 1 \ldots 7 \quad \gamma = u,r \qquad (30)$$

where $l_{M_i,\gamma}(t)$ denotes labour productivity;

$$E_{g,\gamma}(t) = \frac{GW_{\gamma}(t)}{l_{g,\gamma}(t)}$$

where $E_{g,\gamma}(t)$ = government employment in region γ,

$l_{g,\gamma}(t)$ = *labour productivity in government*

$$E_{M,\gamma}(t) = \sum_{i=1}^{7} E_{M_i,\gamma}(t) + E_{g,\gamma} \qquad (31)$$

where $E_{M,\gamma}$ denotes modern employment in region γ

Productivities

$$l_{M_i,\gamma}(t) = f(r_{M_i,\gamma}, L\gamma - E_{M,\gamma}(t), K_p(t)) \qquad (32)$$

where $r_{M_i,\gamma}$ = rate of technical progress in sector M_i in region γ;

$L\gamma$ = labour force in region γ

Similarly,

$$l_{g,\gamma}(t) = f(r_{g,\gamma}, L\gamma - E_{M,\gamma}(t))$$

where $r_{g,\gamma}$ is rate of technical progress in government production

Employment (traditional) sectors

$$E_{T,\gamma} = L\gamma(t) - E_{M,\gamma}(t) \qquad (33)$$

where $E_{T,\gamma}$ is employment in traditional sectors in region γ

$$E_{T_i,\gamma}(t) = \phi_i\ E_{T,\gamma}(t) \qquad (34)$$

where ϕ_i = a constant determined at $t = 0$,

such that $\sum_i \phi_i = 1$

$$l_{T_i,\gamma}(t) = \frac{V_{T_i,\gamma}(t)}{E_{T_i,\gamma}(t)} \qquad (35)$$

$$E_{\gamma}(t) = \sum_{\alpha} \sum_{i} E_{\alpha_i,\gamma}(t) \qquad (36)$$

$$E(t) = \sum_{\gamma} E_{\gamma}(t) \qquad (37)$$

where $E(t)$ is total employment.

Income

Let $\bar{Y}_{\gamma_j}$ denote total income of households in class γ_j before taxes, then:

$$T_p(t) = \sum_j \sum_{\gamma} \bar{Y}_{\gamma_j} \quad t_{p,\gamma_j} \qquad (38)$$

where $T_p(t)$ is personal taxes,

t_{p_j} are tax rates

$$Y_{\gamma_j} = \bar{Y}_{\gamma_j}(1 - t_{p,\gamma_j}) \qquad (39)$$

where Y_{γ_j} = disposable income

$$Y_p = \sum_{\gamma} \sum_{j} Y_{\gamma_j} \qquad (40)$$

where Y_p = total disposable income

$$S_{\gamma_j} = Y_{\gamma_j} - \sum_{i=1}^{7} C_{i,\gamma_j} \qquad (41)$$

where S_{γ_j} is personal savings of households in class γ_j

$$S_p(t) = \sum_{\gamma\ j} S_{\gamma_j} + D(t) \qquad (42)$$

where $S_p(t)$ is personal savings

$$S_g(t) = (\sum_{\gamma\ j} \bar{Y}_{\gamma_j} \quad t_{p,\gamma_j}) + T_M^C(t) + T_{id}(t)$$

$$+ IN_g(t) + T_M^{IN}(t) - GC(t) \qquad (43)$$

where $S_g(t)$ is government savings

$$B(t) = \bar{E}(t) - M^C(t) - M^I(t) - M^{IN}(t) \qquad (44)$$

where $B(t)$ = balance of payments,

$$INGAP(t) = I_H(t) + I_p(t) + I_g(t) + B(t)$$

$$- S_g(t) - S_p(t)$$

where $INGAP(t)$ is a check on computational error

$$\text{Log}\ W_{\alpha_i,\gamma}(t) \sim N(\bar{l}_{\alpha_i,\gamma}(t), \sigma^2_{\alpha_i,\gamma}(t)) \qquad (45)$$

where $W_{\alpha_i,\gamma}(t)$ = payment of wages and profits in sector α_i in region γ;

$\bar{l}_{\alpha_i,\gamma}(t)$ = *mean of the normal distribution of l_{α_i} in region γ*

where $\bar{l}_{\alpha_i,\gamma}(t) = \ln l_{\alpha_i,\gamma}(t) - 1/2\ \sigma^2_{\alpha_i,\gamma}(t)$

$l_{\alpha_i,\gamma}(t)$ = productivity for sector α_i in region γ.

$\sigma_{\alpha_i,\gamma}(t)$ = standard deviation of the normal distribution

where:

$$\sigma_{\alpha_i,\gamma}(t) = k_{\alpha_i,\gamma}\ [\ln l_{\alpha_i,\gamma}(t)]$$

$k_{\alpha_i,\gamma}$ = a co

Household income distribution is derived from personal income distribution by assuming constant number of actives per household. The implicit assumption is that workers in the same household are in the same earnings groups. Hence, $H_{\gamma_j}(t)$, number of households in income class γ_j, can be derived as follows:

$$H_{\gamma_j}(t) =$$

$$\frac{1}{A_\gamma}\Bigg[\sum_i \sum_\alpha E_{\alpha_i,\gamma}(t) \int_{\bar{\gamma}_{j-1}/A_\gamma}^{\bar{\gamma}_j/A_\gamma} d\Lambda(\bar{I}_{\alpha_i,\gamma}(t), \sigma^2_{\alpha_i,\gamma}, W_{\alpha_i,\gamma})$$

$$+ E_{v,\gamma}(t) \int_{\bar{\gamma}_{j-1}/A_\gamma}^{\bar{\gamma}_j/A_\gamma} d\Lambda(\bar{I}_{v,\gamma}(t), \sigma^2_{v,\gamma}(t), W_{v,\gamma}) \Bigg]$$

$$\gamma = U, R$$

$$j = 1, 2, \text{ for } \gamma = R$$

$$j = 1, 2, 3, 4, \text{ for } \gamma = U$$

where A_γ = number of actives per household in region γ; $\bar{\gamma}_{(k-1)}, \bar{\gamma}_k$ = lower- and upper-income limit of household income in class γ_j.

Total income in class γ_j, denoted by $\tilde{Y}_{\gamma_j}$ can be calculated as:

$$\tilde{Y}_{\gamma_j}(t) =$$

$$\sum_i \sum_\alpha E_{\alpha_i,\gamma}(t) \int_{\bar{\gamma}_{j-1}/A_\gamma}^{\bar{\gamma}_\gamma/A_\gamma} W_{\alpha_i,\gamma} d\Lambda(\bar{I}_{\alpha_i,\gamma}(t), \sigma^2_{\alpha_i,\gamma}(t), W_{\alpha_i,\gamma})$$

$$+ E_{v,\gamma}(t) \int_{\bar{\gamma}_{j-1}/A_\gamma}^{\gamma_j/\overline{A_\gamma}} W_{v,\gamma} d\Lambda(\bar{I}_{v,\gamma}(t), \sigma^2_{v,\gamma}(t), W_{v,\gamma})$$

ANNEX II

Bachue-1: Main feedbacks between and within the three subsystems

Dependent variables	*Explanatory variables* 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1. Population		x	x	x																						
2. Death rates																								x		
3 Birth rates					x	x																				
4. Propensity to migrate										x	x												x	x		
5. Desired number of children		x									x												x	x		
6 Uncertainty component					x		x				x															
7. Age at marriage											x															
8. Labour force participation rates																										
9 Labour force								x																		
10. Population related variable	x																									
11. Educational attainment		x		x								x														
12. Enrolment, drop-out, success rates																								x		
13. Household consumption										x														x		x
14 Government consumption[a]	x																								x	
15. Exports																										
16 Investments										x							x									
17. *Value added by sector*													x	x	x	x										
18. Imports													x			x	x									
19. Productivity in modern sectors											x					x					x					
20 Employment in modern sectors																			x							
21. Employment in traditional sectors									x											x						
22 Productivity in traditional sectors																	x				x					
23. Employment-related variables									x											x	x					
24 Household income																			x	x	x	x				
25 Foreign currency reserves															x			x								
26. Capacity of production																x										

[a] The origin of government revenue—constituted of inputs of productive sectors, import duties and direct and indirect taxes—has been skipped.

POPULATION, ENVIRONMENT AND NATURAL RESOURCES: A CRITICAL REVIEW OF RECENT MODELS *

Nicholas Carter **

1. In the past decade, the world has seen several new waves of Malthusian predictions. What makes the most recent crest different from previous ones is the use of mathematical models and the computer. These two modern tools, regarded by laymen as somehow having special powers, plus the publicity arising from their use, have produced what is popularly known as the "Doomsday Model". The popular message of this type of model is simple and Malthusian: mankind is currently outgrowing the capacity of the planet to support it and thus will experience future disasters with falling levels of material welfare and falling numbers of people in the world unless there are profound changes in the nature of current technologies and values. Some of the more extreme predictions suggest that because of the long delays inherent in mankind's corrective mechanisms, there is no way to avoid such disasters; others prescribe zero population growth and zero material growth as a means of avoiding catastrophe. These predictions have come from developed countries, where growing discontent with current trends and values provides a sympathetic audience for such predictions. The models' message, in the context of those countries, is to stop growing in order to maintain or reduce current levels of living while reducing sharply the material content of such levels. The focus of these discussions is "the American way of life" or its counterpart in other developed countries, and the prescriptions are basically oriented in that direction. Little is actually said about the developing countries of the world other than the ever-popular words of wisdom, "don't populate". The practical implications of the prescriptions are quite ominous for the developing countries; no growth in the material level of living, combined with a very long lag in any practical reduction of population, easily produces for them the Malthusian result, while, at the same time, it is predicted that the developed countries would be able to survive with far less drastic problems. This is certainly not an acceptable outlook for the world community of nations.

2. It is thus very important to look closely at the basis for these predictions and the models involved. Moreover, when one looks more carefully at the field of population and resource analysis one discovers a number of well thought-out studies that are worth serious attention, if only in a comparative sense, but which, unfortunately, have not been given much attention. Lastly, one finds that in response to the message of the "doomsday" models, several attempts have been made to redefine objectives and to work out future scenarios that will meet both the resource limitations and, at the same time, satisfy objectives of providing all mankind with at least certain minimum levels of welfare.

3. This paper takes a critical look at world models (most of the doomsday models fall into this category), at the more conventional population and resource analyses and at the attempts to work out suitable alternatives. The paper does not pretend to be exhaustive. There are a large number of existing models; the selection has been based upon their intrinsic interest, the publicity that they have gained and their availability to the author. The common characteristics of all the selected models are that the time span is at least to the year 2000, and usually beyond and that there is a population projection which is linked to the economy and/or resource requirements in either direction. Thus, purely demographic projection models, purely economic models and short-run models are omitted.

4. A common model begins with a projection of population, as a rule for a period of about 50 years. Given the nature of population dynamics and the fact that the time constant for human populations (that is, the time it takes for a given demographic change to work itself through the population) is on the order of 70 years, it is fairly easy to make such a projection; and given the nature of uncertainty in long-term projections, the forecast of population is by far the most accurate element in any model. The next step is to link these population projections to demands on resources (in varying degrees of aggregation) or to such macro-economic variables as consumption and investment, and thus the growth of output. Lastly, in the more innovative cases, the projections of material levels of living are connected back to such demographic variables as birth and death rates, thus completing the cycle. The more conventional of these models study the interactions in both directions and try to predict the magnitudes of the future on this basis, while the world models add resource constraints, which, in turn, usually prevent the

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orderly growth of the system, and thus conclude either that the future projection must be drastically modified, or that there must be immediate and significant changes in policy that will modify the interactions of population and resources.

5 A feature often present in both types of models is a consideration of environment The environmental dimension is much more difficult and has thus far proved to be a serious, but not critical, element in the consideration of the future, i e., in some runs of the doom models pollution is the cause of disaster; but with relatively small changes in policy such scenarios can be avoided. [1]

6. It should be made clear that this paper is an attempt to look at different types of models Their common characteristics are the links between population, resources and (sometimes) environment It is not intended that the models in their entirety be compared directly with one another Clearly, they are designed for different purposes; each is judged more on how it answers the questions it was designed to address and on how it represents the population-resource-environment nexus. World models (or doom models) address the global problems of mankind Their weaknesses seem to arise from chronic under-specification Conventional models look at countries or sectors These models, also, are usually under-specified and they implicitly assume the rest of the world to be infinite and unchanged This latter fault, perhaps, limits their usefulness in the long run, but certainly does not rule them out as guides for medium-run policy action

7. Running through many models, in particular the more celebrated ones, one finds the theme of systems dynamics, which is an innovative tool enabling one to have insights into the workings of systems that would *not be possible with conventional methods. Its great* success has been with micro-systems where, as long as the system was correctly and completely specified, it has proved far more incisive and encompassing than conventional tools Its efficacy on macro-systems, where specification is, by necessity, incomplete, is still very much a matter of debate A great deal is made of the counter-intuitive nature of systems and thus the necessity of using systems dynamics It is basically a simulation method, not radically different from conventional projection model systems It is extremely flexible and much easier to use than most, but when used for macro-systems suffers more than usual from the problems that plague all simulations In most micro-systems it is fairly easy to agree on an exact specification, to model each interaction and even in some cases to verify by experiment. In macro-systems such is not the case. Rarely, if ever, is there agreement with regard to the correct specification of the system Computer space does not allow an exhaustive specification, and attempts in this direction have thus far proved to be intractable. Verification experiments almost never can be carried out, and it has proved almost impossible to avoid an incorporation of subjective bias into macro-models. Perhaps most important, primarily because of chronic under-specification, a multitude of models can all be equally "proved" using accepted measurement techniques on the same body of data Systems dynamics and its associated computer tools make it extremely easy to build a model and thus to "discover" a fundamental truth, which, in reality, arises from a misspecification [2] Properly used, however, it can be a powerful analytical tool.

8 This paper examines 11 models relating to population Of these, three fall into the world model category "World Dynamics", [3] "Limits to Growth"; [4] and "Models of Doom" [5] Six models may be classified as conventional the Coale-Hoover model, [6] the TEMPO model, [7] the Bachue model, [8] the Bangladesh model, [9] the United States Population Commission model, [10] and the model created for the Government of Mexico by the International Bank for Reconstruction and Development (IBRD-Mexico) [11] The Coale-Hoover model is included, not because it is recent, but because it was the first serious attempt in modern times to deal with the connexion between population and resources and, as such, many other models are descended from it Lastly, two additional models are considered which represent attempts to reformulate the objectives of growth and development and to build future models upon this foundation· the Latin American World Trade Model [12] and the Japanese World Model. [13] These

[1] Based on experiments conducted on the World 3 model (the "Limits to Growth" model) by the author of the present paper See Donella H Meadows and others, *The Limits to Growth A Report for the Club of Rome's Project on the Predicament of Mankind* (New York Universe Books, 1972)

[2] It is the opinion of this author that some (by no means all) of the more spectacular findings of the Limits to Growth" [illegible] mena rather than [illegible] nan race [illegible] ambridge, Mass [illegible] cit [illegible] *of Doom* (New [illegible] *tion Growth and Economic Development in Low Income Countries* (Princeton New Jersey Princeton University Press 1958)

[illegible]

[10] R Ridker, ed , *Population, Resources and the Environment*, vol III of Commission research reports, Commission on Population Growth and the American Future (Washington, D C Government Printing Office, 1972)

[illegible]

Techno Economics Society, 1973, mimeographed, *idem*, "Toward a global vision of human problems—global const [illegible] and new vision for development", Toky[illegible] n Tech[illegible]nomics Society 1973, mimeographed.

models are particularly important because they begin with the implied doom model message that the Western way of life is probably no longer viable and they seek to discover if some other way of life is perhaps more viable. There are, of course, other groups engaged in similar work, but the non-Western attempts have been chosen as being potentially more representative for mankind as a whole.

9. Not discussed in this paper, but worthy of mention, are the efforts of several other groups. In the Netherlands, under the direction of Tinbergen and Linnemann, work is under way on the agricultural section of a world model. At Case Western Reserve University (Cleveland, Ohio) under Mesarović, and at Hannover under Pestel, an "alternative world model system" is being created which appears to have great promise. Lastly, at Harvard under Leontieff, a world model system is being built from a series of input-output systems. Its basic structure is similar to that of the model used by the United States Commission on Population Growth and the American Future.

World dynamics

10. The model in the book, *World Dynamics* (technically termed "World 2"), produced in 1970, was developed by Jay W. Forrester of the Massachusetts Institute of Technology (MIT) and later was adopted by the Club of Rome. As such, it is the first world model and represents a good, but hasty, look at the over-all problem of the relation of population, resources and environment in the context of the entire world. Its value lies in the fact that it called attention to the possibility of a conflict between the continued growth of the world population and the world economy on the one hand, and the limitations of resources and of absorption of waste, on the other.

11. The model consists of four key variables: population; natural resources; capital stock; and pollution (this variable in all the world models does not refer to short-lived pollution, such as smog, but rather to the long-lived pollutants, such as DDT and mercury). Each of the four variables is related to the others through behavioural relationships. A fifth variable, capital investment in agriculture, determines the amount of food available to the world. There are a large number of intuitively specified links between the five variables, most of which have little or no effect on the workings of the model, unless certain extreme assumptions are made to activate them. [14] In the standard run of this model, population increases gradually until it reaches a level somewhat over 5 thousand million in the year 2020, after which it declines at about the same rate. The material level of living, which essentially reflects the *per capita* availability of fixed capital, rises until about 1990 and then falls fairly smoothly. The population growth rate is determined chiefly by this material level of living and also by the density of population (termed "crowding"). Since the growth of population is simply the difference between the birth and death rates, the key relationships are the effects of material levels of living and crowding on these rates. According to the assumptions of the model, the death rate is much more sensitive to these variables than is the birth rate, being pushed up from the normal of 28 per 1,000 to the mid-1930s by crowding, and then to the mid-1940s by a falling material level of living. At the same time, the birth rate drops slightly from the normal 40 and then rises as levels of living fall. The two other variables affecting the birth and death rates are food and pollution; these have a potential for making significant shifts, but, in the normal extrapolation of current trends, play little or no part.

12. In World 2 one clearly sees the effect of crowding and material well being on demographic rates. These, however, are very simplistic relationships and have been criticized as such, particularly on the grounds of non-reversibility. As specified, the functions work in both directions, that is, as material levels of living and crowding rise and fall, even though the observations available to the model-builder were only for rising trends. This implies that as incomes go up, birth rates will fall, a phenomenon that is reasonably well documented; while at the same time, if incomes fall, birth rates will immediately go up again, a proposition which does not appear reasonable. Similarly, while crowding acts weakly to lower birth rates, it does not follow that an absence of crowding will raise them. Moreover, while the effect of crowding on death rates may have been evident in the days of the Black Death, it does not follow that such would now be the case and that uncrowding would reduce the death rate; nor does it follow that whatever the effect of crowding on demographic variables is, that the effect is independent of levels of income.

13. Thus, while the effects of economic and social variables on population may have been taken into account in the model, though in rudimentary fashion, one cannot treat the results as definitive predictions. Far more work must be done, as, indeed, the author freely admits.

14. The question may be asked, with respect to opposite interactions, what the effects of population levels are on economic and social variables. The key variables in this part of the model are natural resources and capital stock, which determine the material level of living, which, as has been seen, affects the demographic variables of the model. Natural resources are given to the system in a fixed amount at the beginning of the model and are steadily used up by the process of creating capital stock. Capital stock grows according to the difference between the rate of investment and the rate of depreciation. In the initial stages of the model, this growth rate is about 0.4 per cent per annum and

[14] Statements concerning the way in which the Forrester model (World 2) and the "Limits to Growth" model (World 3) work have been derived from the author's own fairly exhaustive testing of the actual computer models involved.

it falls steadily as natural resources are used up, until ultimately it reaches the limit of −2.5 per cent, which is the constant rate of depreciation. No matter what assumptions are made, natural resources eventually run out and the system stops growing.

15. There are many apparent links from the population section to the capital investment and natural resources parts of the model, but in actual model practice, these links are either self-cancelling, or negligible.[15] The speed of the rise and fall of the "world system" depends almost exclusively upon the amount of natural resources remaining and the level of capital investment. This latter relationship is set up so as to increase the rate of resource usage as the capital stock grows. While this may be a plausible aggregate representation (one of many possible) of past secular trends, it rules out the feasibility of policy changes in the model designed to "save" the system. The problem is neither the model nor the intrinsic nature of the world, but that the relationship is an under-specified aggregate. For example, an increase in the productivity of capital would be expected to reduce the investment rate and, thus, the usage of resources. In the World 2 model, such a change increases the effective capital and, thus, the level of living and, thus, the usage of resources. Moreover, the higher the level of capital stock, the greater the level of pollution, so that any attempts to get more production from a given amount of resources or, for that matter, to increase the amount of resources, produce "pollution crises" which themselves bring on the collapse. Therefore, it does no good, in the context of the World 2 model to increase the natural resources available either in a lump amount or on a gradual basis, collapse cannot be avoided. The fact that an increase of resources or a rise in the productivity of capital still brings collapse, and in some cases more rapidly, is cited by J. W. Forrester as an example of the "counterintuitive nature of social systems".[16] It is suggested that it may be a case where the model-builder has failed to understand and specify in sufficient detail the real workings of particular subsystems, particularly that of capital.

16. Thus, one has the World Model in which there is a link from resources to population that operates partially, but not entirely, satisfactorily and a link from population to resources that is virtually non-existent. The model indicates a high probability of collapse, not because this is the way the world necessarily behaves, but because of the particular manner in which the model was specified.

The "Limits to Growth" model

17. J. W. Forrester recognized many of the shortcomings of his model and urged continued research into the problem. While many critics were loudly pointing out the flaws in the model (and some criticism was frankly emotional rather than scientific) a group of Forrester's students at MIT (under the leadership of Dennis Meadows) began to modify and improve the original World 2 model. This group produced a model, called "World 3", the results of which were published in 1972 in *The Limits to Growth*.[17] Whereas *World Dynamics* presented a discussion of the problem and the conclusions, as well as a completely documented version of the World 2 model, *The Limits to Growth* contains only the conclusions from the World 3 model and, through no fault of the Meadows group, was presented to the world in a spate of popular publicity. The clear message of doom (at least for the "American way of life") was ascribed to the work, and the obvious suggestions of critics (such as resource cornucopia) were answered with computer runs "showing" that such advice was not of any benefit to the world.[18] While World 3 and its technical background[19] have always been available from the group at the Massachusetts Institute of Technology, formal publication was scheduled to occur more than two years after *The Limits to Growth*, a delay that is perhaps inconsonant with the immense publicity given to the book. This situation is, perhaps, unfortunate for the model and for all population-resource models in general, for as the group began to make the model itself available to a few researchers, it became evident that the World 3 model was in need of more work and that the sensational conclusions ascribed to it were for the most part unjustified. Having been prematurely over-publicized, it will be difficult in the future for this or any other serious piece of work with similar pessimistic conclusions to get the serious attention it deserves.

18. In World 3, as in World 2, the central parts of the model are the population subsystem and the capital stock-natural resources subsystem. There are other state variables, such as pollution, service capital and land, but, in general, these variables play the same minor roles as they did in World 2.[20] The general nature of the model is the same. The population system has weak inputs from the capital and resources system, but the equation links from population to capital and resources, although existent, virtually cancel out the effects of these variables. There is, thus, an essentially self-generated capital stock whose growth is determined by the parameters chosen for it and whose end comes

[15] The author has fairly exhaustively tested the World Dynamics model, and the description of the way in which the model works is derived from these tests.

[16] Jay W. Forrester, "Counterintuitive behavior of social systems", *Technology Review*, vol. 73, No. 3 (January 1971), pp. 52-68. One wonders how much of this counterintuitive behaviour is simply a re-expression of the familiar "fallacy of composition".

[17] Donnella H. Meadows and others, *op. cit.*

[18] *Ibid.*, see especially chap. IV.

[19] Donnella H. Meadows and others, *The Dynamics of Growth in a Finite World* (to be published). This is the technical report to *The Limits to Growth* and has gone through at least three versions and countless extensions of the publication date. At this writing, the publication is scheduled for mid-1974, more than two years after publication of *The Limits to Growth*.

[20] The author has fairly exhaustively tested the "Limits to Growth" model and the description of the way in which the model works is derived from these tests.

when natural resources are so depleted as to require the diversion of capital to resource extraction rather than to making new capital. Eventual collapse has thus been built in, regardless of what happens to the rest of the model. [21]

19. The population subsystem of the model World 3 has considerably more detail than did World 2. In itself, it is fairly well constructed, using four cohorts in the standard version and 15 in a more detailed version. Each cohort has its own demographic parameters and the over-all system is probably as good as most in terms of the prediction of over-all population size up to 50 years in the future. The links from the rest of the model to the population subsystem are, for the most part, non-functioning in standard runs of the model. Births are regulated through a variable called "total fertility", while deaths are controlled by life expectancy. Fertility is specified to be determined by social and industrial output *per capita*, and by life expectancy. What turns out to have virtually all the effect in the actual running of the model is the change in the level of income. [22] This change is scarcely more than the classical relationship between the birth rate and income; and, as in World 2, the model-builders treat it as a reversible relationship. [23] With deaths the situation is similar. Life expectancy is modeled to be determined by pollution, crowding, availability of health service and availability of food. In the actual running of the model, the largest impact comes from crowding (although in the early part of the model there is a one-time decrease in the death rate caused by the general improvement of health in the 1930s). The crowding multiplier is a function both of population density and also of income level, the latter being capable of changing rapidly, the former very slowly. The authors reasoned that plagues result from crowding at low income levels; and thus, as income falls because the world runs out of resources, [24] a "Black Death" hits the population of World 3. This is as close to disaster as either World 3 or World 2 gets; and it is built in, one suspects, as the result of reversibility of the model rather than on purpose. Again, one has the situation of a population system that is internally well defined, but whose links to the rest of the model need strengthening.

20. In the capital section, however, even the internal mechanics are in need of repair. This is the key sector of the model, the one that is primarily responsible for the familiar over-shoot and collapse which has given rise to so much controversy.

[21] Except, of course, in the extreme case of infinite resources, where pollution and/or agricultural-land scarcity provide the collapse.

[22] This conclusion is derived from the author's fairly exhaustive tests of the "Limits to Growth" model.

[23] The key variable seems to be "desired total fertility" (DTF) and most of its variation comes from "industrial output *per capita*" (IOPC) by way of a delay system. See Donnella H. Meadows and others, *The Dynamics of Growth in a Finite World*, *op. cit.*, chap. II, equations 122, 127 and 128, and fig. II-49.

[24] *Ibid.*, chap. II, fig. II-39.

21. When looking at the capital sector, one is immediately struck by its "counter-intuitive" behaviour. In one experiment an attempt is made to prolong the collapse by increasing the productivity of capital. Intuition says that such an increase (through the lowering of incremental capital/output ratio (ICOR) should give more output for a given amount of capital and thus be less intensive in the usage of non-renewable natural resources, thereby prolonging the time for which such resources can be used. The model, however, gives the opposite result; instead of a collapse in year 120, industrial output begins to fall sharply after only 70 years. The authors then go on to imply that this is an argument for not varying this constant in the policy simulations, on the grounds that the model is too sensitive to ICOR, [25] but the counter-argument might also be made that this is a good reason to examine closely the reasons why the model so behaves. Moreover, if one is "counter-intuitive" and increases ICOR (thus lowering the productivity of capital), the model gives the world an extra 50 years before collapse. [26] One could say the model is counter-intuitive, but "Occam's razor" would suggest that the capital sector may not have been specified correctly.

22. In the capital sector of World 3, industrial capital is assumed to be the source of all capital goods and of a sizable fraction of consumer goods. Thus, unless there is industrial capital, the model can only function at a primitive, peasant society level where everything that is produced is food and services. (Even here the model is not clear, as it requires $40 of capital *per capita* to produce services even when industrial output is zero. A better definition, perhaps, of the services sector would be to allow this subsistence level of services to be produced without capital.) Industrial capital in the model is generated on a residual basis from industrial output, which itself is generated from industrial capital. This very tight loop is interrupted only by the need to supply capital to other sectors and the need to use capital to extract natural resources and depreciation, and continues so long as there are natural resources still available. The main parameters that determine the dynamic characteristics of this loop are ICOR, the lifetime of capital (ALIC) and the fraction of capital necessary to obtain resources (FCAOR).

$$\frac{d\ (IC)}{IC} = \frac{A\ (1 - FCAOR)}{ICOR} - \frac{1}{ALIC}$$

where IC is industrial capital.

The parameter A contains two variables that, in practice, are slightly sensitive to population, but, in general, move only after a collapse. [27] In a normal run, the value of this equation is about 4.5 per cent per annum.

[25] *Ibid.*, p. VII-24 and fig. VII-10.

[26] This conclusion is derived from the author's fairly exhaustive tests of the "Limits to Growth" model.

[27] Donnella H. Meadows and others, *The Dynamics of Growth in a Finite World*, *op. cit.*, p. III-78; also experiments by the author of this paper.

23 Looking briefly at the formulation of FCAOR, the natural resources limitation, it is a function of natural resources remaining in the system This function is such that FCAOR is 0 05 until the natural resources reach 50 per cent of their original level, at which point it jumps to 0.10 and then rapidly to 0.70 as the fraction remaining drops to 20 per cent, ultimately reaching 1 0 when natural resources are at 0 per cent of their original level Critics have argued about the rapidity of growth of costs (especially since they have, in general, fallen over the past 70 years), and the concept that it is industrial capital that must be diverted in order to obtain natural resources The usage rate of natural resources is the product of population (the more people you have, the faster you use resources) and the usage rate *per capita* The latter is a rising function of industrial output *per capita*, which tends to taper off at high levels of income The result is a steady depletion which is accelerated by an increase in population or level of living, with only very weak provisions for slowing down and no provisions for replenishment of any kind Under this kind of formulation, a collapse result is inevitable Note that this is the only link between population and the capital and resources systems The model does not consider consumption, prices,[28] consumer utility or any of the many linkages that modern economics would suggest as having an effect in determining capital formation and resource use All World 3 has is a steady drain on resources, which is determined by how many people there are and how rich they are Since changing the size of the population is a long-run question and the amount of resources given to World 3 is fixed and relatively small, it is difficult to avoid a conclusion of doom

24 Consider now two suggestions of model critics, the lowering of ICOR and the increasing of the lifetime of capital Suppose ICOR were 2 0 (instead of 3), then the growth of capital, by the above-mentioned formulation, jumps to 11.3 per cent. Similarly, if ALIC were 20 instead of 14, the rate of growth of IC would be 7 3 per cent Both cause faster growth and both thus bring the system into a more rapid collapse Even assuming an infinite supply of natural resources, this formulation leaves something to be desired.

25 The key problem here is that of the industrial capital investment rate As defined in World 3, it is a residual and only changes because some other demand for industrial output changes There are no direct links with the depreciation rate, and this aspect gives the system its counter-intuitive behaviour There are no links with population or its growth rate, nor are there any links with demand or expectations of demand. The investment function simply says that the system invests whatever is left over, no matter how large or small and no matter how related this supply is to the needs of the system This is an archaic form of the investment function, similar to the "investible surplus" idea. But the investible surplus theory relates to subsistence economies and refers to agricultural, not industrial, output Moreover, even if one subscribed to the idea that the investors of the world are motivated to invest whatever they can get their hands on, the behaviour would have to be modified somewhat by calculations of short-run profit, which itself has to be related to the demand of the system

26 To be fair, there are a number of "equilibrium" runs shown in both *The Limits to Growth* and *The Dynamics of Growth in a Finite World* These runs imply a number of extremely difficult direct and immediate policy choices to be made by the leaders of the world if the model is correct and if the world wishes to arrive at some kind of non-collapse equilibrium. Moreover, it is highly unlikely that such choices would be made in time even if everyone accepted the conclusions of World 3 as gospel Therefore, both World 2 and World 3 must be implicitly regarded as doomsday models

Models of Doom

27 One of the groups to whom a copy of *The Dynamics of Growth in a Finite World* was made available was the Science Policy Research Unit at the University of Sussex. They made a careful analysis of the World 3 model, criticized each parameter in detail and formulated a number of modifications of their own Early in 1973, they published a book of their findings under the title *Models of Doom*[29] The work is recommended for understanding in detail both the philosophy and the mechanics of *The Limits to Growth*[30] It is considered briefly because it has made a number of modifications to the model in an attempt to make the model more realistic These modifications are, in general, those which have occurred to most critics increasing the amount of resources, lowering the sensitivity to pollution, changing the productivity of agriculture etc No structural changes have been made, however, to the key sectors of population and capital or to the links between them. Its primary purpose is a critique, and, as such, it works within the framework of the models it criticizes.

28 This paper has dwelt at length on world models because they have received a large amount of publicity, and because they have, in general, made their detailed specifications available to interested researchers The general conclusion is that, although they call attention to a potentially serious problem for the world as a whole, as models they have significant short-comings A series of more conventional models that look at the interactions between population and resources is now considered. These models do not try to predict the future of mankind, but they do permit forecasts to be made of possible future behaviour, particularly in the shorter run As discussed above, they should not be

[28] Specifically, if prices rise, demand should fall World 3 implicitly assumes demand *per capita* to be fixed and thus equilibrates the system by increasing costs

[29] H S D Cole *op cit*

[30] *Ibid* See, in particular, chap 2

compared with the world models, but rather looked at in terms of their specifications.

Coale-Hoover model

29. The Coale-Hoover model is included because it was essentially the first to look at the links between demographic trends and the workings of a national economy. Published in 1958, the model argued that economic growth is critically dependent upon investment, and thus upon savings, and that savings is affected by the fertility of the population.[31] Fertility is taken to be independent of changes in the level of economic well-being, or at least not within the framework of the model. The model, therefore, focuses on the linkage from population to the economy, the two main sectors themselves being conventionally[32] defined. The key linkage is through savings and investment. The savings equation is defined so as to produce higher rates of saving at higher levels of income *per capita*. In a situation of two possibilities, with identical terminal year incomes, the one with the lower rate of population growth in the period will have a higher level of income *per capita* and thus a higher rate of saving. Beyond this, the investment function is divided into two parts, one productive, the other termed "welfare". It is the latter part that depends upon the size and the rate of growth of population, but it is the productive investment that is the resultant residual from savings. This productive investment then determines the growth of the economy. From this very simple and illustrative model have come many variations by many authors, one even going so far as to state that there is a direct relation between the debt-service ratio of a country and the magnitude of its population control programmes.[33] Such was not the intention of Coale and Hoover, who merely wanted to draw attention to the intuitive relationship between the size and growth of the population and the rate of advancement of economic welfare.

30. This approach has been criticized in more recent years for a variety of reasons.[34] These reasons can be summarized by pointing out, first that personal saving comes from groups whose fertility is likely to be low already and whose consumption patterns are not likely to change with changing fertility; secondly, that among lower-income groups a lower dependency burden results in a higher consumption *per capita*, without affecting savings; and, thirdly, that the amount that Governments currently spend on population size dependent welfare investment is so relatively small that changing this type of activity over a wide margin has little or no over-all effect on over-all investment.

[31] See A. J. Coale and E. M. Hoover, *op. cit.*

[32] "Conventionally" should be regarded as referring to economics.

[33] Such a conclusion was drawn from an early descendant, TEMPO I.

[34] J. N. Sinha, *Macro-Models and Economic Implication of Population Growth* (Liège, Congrès International de la Population, 1973).

Tempo model

31. A direct descendant of the Coale-Hoover approach is the General Electric Company's TEMPO model formulated under the direction of S. Enke. The original version of the TEMPO model had the Coale-Hoover savings function, essentially:

$$S = aP + bY$$

where $a < 0$, P = population, Y = income,

so that a higher population served to lower the savings of the economy and thus investment and growth. A later version added a link from population to the labour force and thus to production.[35] The current version, TEMPO II, is considerably more sophisticated.[36] The population section of the model consists of 65 cohorts, each with its own specific survival rate, an amount of detail which is, perhaps, unnecessary. Births are assumed to be a function of fertility, a variable which can be affected by expenditures on family planning (and in the aggregate by migration). Such expenditures, however, are an exogenous policy variable and thus are not a link from the economic to the population section. They do, however, come from available public sector resources and thus are a subtraction from resources that can be put into capital stock and thus into growth. Since the magnitude of such expenditure depends upon the size of the population (the policy variable being an acceptance rate), this constitutes a link from population to the rest of the model.

32. The economic sector of the model consists of a modified Cobb-Douglas production function that utilizes capital, educated and uneducated labour and assumes exogenous technical progress. There is a public sector that allows canalizing of resources into population-related activities and a foreign sector that allows foreign aid; but these are largely for the purpose of accounting and explanatory convenience. The labour force is derived from the population figures and the portions that are educated and uneducated depend upon expenditures for education. Here again, the expenditure is the product of the size of the population in the appropriate age groups and the policy target rates for enrolment in each of four levels of education. Thus educating the labour force, which increases its productivity in the production function, costs resources which could otherwise be invested in capacity. The key link from population to growth is, as before, the savings function, which, in this version, is expressed as a consumption function:

$$C = aYD + bP$$

where

$$b = d\left\{\frac{YD}{P}\Big/\left(\frac{YD}{P}\right)_0\right\}^e \quad 0 \leq e \leq 1$$

[35] W. E. McFarland and others, *Description of the Economic-Demographic Model* (Santa Barbara, Calif., General Electric Company, 1968).

[36] W. E. McFarland and others, *op. cit.*

YD is disposable income and *P* is population This formulation clearly depends upon the value assigned to the parameter "*e*" If it is unity, then consumption is solely a function of income and there is no population link. If it is zero then one has the Coale-Hoover system, which is similar to TEMPO I. Such a formulation is designed to allow the model to meet the criticisms of various authors (generally by setting "*e*" close to 1 0), and, at the same time, is in a form which would permit estimation on developing country data so as to ascertain whether "*e*" was significantly different from unity. In terms of sensitivity analysis, it is clear that, in the model, growth of income *per capita* will be quite sensitive to changes in this parameter and that it is through this parameter that demographic changes are principally transmitted to the economic subsystem

International Bank for Reconstruction and Development—Mexico

33 A far less ambitious model is one that has been used in the International Bank for Reconstruction and Development (IBRD) for routine long-run projections, a typical example of which can be found in an analysis of the likely trends in Mexico to the year 2000 [37] In this analysis, the central projection is that of population, an analysis of which is carried out by five-year cohorts with country-specific mortality and fertility data. Fertility assumptions are then introduced in order to produce three projections: continuation of current trends, moderate effort on fertility reduction and optimistic assumptions on fertility reduction In general, the moderate effort projection is used as a framework upon which to place the economic and resource projections Thus, the linkages all go from population to resources and to the economy, there are no linkages back to the population projection, which remains fixed throughout the analysis In the Mexican case, the key resource constraints were land, water and energy. For each of these constraints, a projection of potential supply was made, and for water, this was done on a regional basis Each supply estimate was then compared with the likely demands for the particular resource over the range of population projections, and, in the Mexican case, it was found that only energy would be a constraint. This constraint, however, is assumed to be satisfiable from imports, thus the analysis turned to an exercise in exports and balance of payments projection At the same time, rough targets for output were made so that the general framework and magnitude of the macro-economy could be seen This, then, forms the foundation for an assessment of employment-potential utilizing known employment trends and elasticities on a sectoral basis, which can then be compared with the potential labour force in 2000 to arrive at an idea of the magnitude and gravity of the unemployment situation in that year. Lastly, given the potential number of people and their location, an analysis is made of the potential deficit in social capital and the costs of filling it. This latter set of figures can be fed into a public-sector model, which itself is linked to the macro-model and can thus be used to estimate necessary fiscal policy. This model differs from most of those discussed in this paper in that it looks only at a target date and does not try to simulate the system (other than the time-dependent population and external debt sections). It is thus much less deterministic while, at the same time, being more closely focused on the qualitative and semi-quantitative aspects of economic and social policy.

[37] This model was built in connexion with the International Bank for Reconstruction and Development basic economic mission to Mexico in 1972

Bangladesh model

34 A more deterministic system has been built by Dorfman of Harvard University as part of the East Pakistan [38] Land and Water Resources Study This model begins with three exogenous population projections to the year 2000 (ranging from increases of 2 5-3 25 per cent per annum) and then seeks to determine what is necessary for the growth of gross domestic product (GDP), domestic savings and taxation, and foreign aid in order to achieve an employment rate of at least 95 per cent at target dates As in most of the models discussed in the paper, there are no links from the economy to population, rather, population is determined *a priori* and is the framework upon which the rest of the analysis is based Moreover, the model requires that an actual growth path be calculated from the present to the target date The economy is divided into seven productive sectors, each of which is constrained to follow a sector share of total output derived from international cross-sections Every five years, an iterative calculation is made, using sectoral productivity trends from cross-section analysis, to arrive at the level and composition of income that will meet the employment targets This level of income then uses cross-section estimates of saving to determine the internal resource generation and similar estimates of ICOR to arrive at the demand for such resources. The deficit then becomes the total foreign capital inflow, private flows plus official aid necessary to achieve the target. This type of model, therefore, does not consider the impact of population on physical resources and assumes that there is no practical limitation on the supply of such resources. It is essentially an employment-population driven financial analysis.

United States Commission on Population Growth

35. A fairly well developed model was utilized by the United States Commission on Population Growth and the American Future. With respect to the period 1970-2020, this model is, perhaps, the most detailed and sophisticated of the national models Like many

[38] Now known as Bangladesh

others, however, its direction of causality is from two alternative exogenous population projections to a whole host of economic, physical and social considerations. Moreover, it concentrates on the United States of America; and although it acknowledges the rest of the world, it does not, in general, look beyond the national framework. Specifically, it ignores most of the global problems raised by the world models, even though the United States would be one of the chief contributors to the problems raised by those models. Beginning with two population projections, the analysis then posits two different economic growth paths. The high alternative assumes productivity to grow at 2.5 per cent per annum and work hours to decline by .025 per cent per annum (this generally expresses the current trend). The low-growth alternative has the same productivity but man-hours decline by 1 per cent per annum. The two population and the two economic projections give four alternatives with income *per capita* ranging from two to four times current levels.

36. The key vehicle for carrying out the projections is an adaptation of the Maryland Interindustry Model. This 185-sector model was modified in several ways in order to be able to use it for long-run analyses: technological coefficients were introduced to allow the coefficients of the matrix to reflect anticipated technological changes, certain linearly decreasing functions (appropriate for short-term but not long-term forecasts) were replaced by exponential delay-functions, and specific pollution and treatment cost coefficients were introduced. Moreover, the model was given a new set of consumption functions that related to demographic as well as economic characteristics, a public sector set of equations responding to similar variables, specific relationships for about 20 commodities believed to be crucial over the period and an explicit pollution section. This enlarged model thus allows a fairly detailed analysis of the economic, resource and environmental impacts of different population and output trends.

37. Such a framework represents perhaps the most useful and meaningful way of looking at developed countries. However, its data and operational requirements are inappropriate for developing areas as are certain parts of the analysis (typically those dealing with pollution and physical resource constraints). The beginnings of a valid world model might well be made by combining this model with similar analyses for Japan and the Common Market. [39] Such a formulation would, then, define the magnitude of the resource and pollution problem for the world as a whole and would give an indication of the demand on resources that the developed countries will be placing on the rest of the world. The developing countries require less sophisticated models and ones that concentrate more on the interactions flowing from economic factors and resources to demography. Only after well worked-out models of both types are available, and more importantly, after it has been possible to model the interactions between rich and poor on the world, will it be possible to approach an operationally valid world model.

International Labour Organisation: Bachue model

38. The model called Bachue, [40] that is being built by the International Labour Organisation (ILO), is based upon a systems analysis that seeks to focus on the links between population and economics in both directions, specifically concentrating on the economic determinants of demographic variables, which are not treated in the conventional models and are as yet limited in the world models. As this is an ongoing study in an ambitious long-term project, there are no "results" as yet; [41] in fact, the modellers have been careful not to draw premature conclusions either about the structure of underdevelopment or the future of mankind. The model has been extensively worked out both in the demographic section—with age, sex, location and education cohorts; and in the economic section, with inter-industry analysis covering seven sectors. The usual links from population to the economy are found in this model; much more important, however, are the specific links from economic to demographic variables. Births, deaths, migrations, labour force participation and demand for education are all related to variables outside the population section.

39. As it now exists, Bachue is a carefully delineated system potentially capable of performing a detailed analysis and projection of a developing country. The largest job is still before it, however. This task is to obtain data for a specific country and to verify that the specified interactions do indeed exist, and that, moreover, they are important and necessary parts of any forecasting system. Bachue is still far from being an operational tool that can provide specific information on long-run outlooks or that can provide specific answers to the questions raised by the world models. The key question, which Bachue has the framework to address even now, is how quickly the demographic variables, and particularly the level of fertility, react to economic and resource changes. The world-modellers imply that the reaction time is too long to prevent collapse; the optimists claim that it does not matter because technology will save the world. It may well be that demographic variables will act quickly enough to make most of the doom prophecies irrelevant. Bachue seems to be an appropriate framework for looking at this question.

Latin American world model

40. Two models are of interest more for their objectives than for their structural content. Both the Latin

[39] This project is, in effect, what is now being carried out under Leontieff.

[40] Bachue is the Colombian goddess of love, fertility and harmony between nature and man—a fitting title for an investigation into the long-run future for mankind. See Richard Blandy and René Wery, *op. cit.*

[41] Prelimary runs indicate that considerably more research is necessary.

American model[42] and the Japanese model[43] are attempts to answer the problems raised by the world models, not by improving the data or changing the structural equations (although this certainly is done), but primarily by changing the objectives of society placed in the model. Thus, instead of asking whether mankind can survive ever-increasing levels of material income in a finite world, the models ask whether there can be a future where particular regional life-styles are viable The Latin American model begins from the premise that every person has the right to certain minimum levels of food, shelter and material goods This condition is considered to be the foundation of the model, a foundation which can be reached through the removal of "socio-political constraints" Once this initial condition is satisfied, then growth is permitted on a regional basis in accordance with regional preferences, subject, however, to absolute constraints of the environment and resources; it is assumed that the initial conditions do not violate any environmental or resource constraints. The model uses five regions, two developed and three developing; and after assuming the two groups are independent, explores the possibilities of interaction with the purpose of furthering the goals of the poorer groups The hope of the modellers is to demonstrate that the achievement of certain minimum goals for all mankind is materially and technically possible, and in doing so to demonstrate that the whole business of doomsday models and predictions is essentially an affair of the developed countries: they will cause it and they will suffer from it, a large part of the developing world already being in the state of misery with which doomsday popularizers frighten their wealthy readers

Japanese world model

41 With the Japanese model the circle of world models is completed This model (or series of models) is being developed by the Japanese members of the Club of Rome (the group that supported the research for the World 3 model). The theme of the studies thus far undertaken is not collapse, but rather a search for feasibility The first model seeks to answer the same question as the Latin model—how the needs of the whole world can be satisfied in a material sense. For this purpose, the model uses nine regions and six output sectors and looks at the flows necessary between regions (both trade and aid) that would be necessary to satisfy these needs A particular focus is the redistribution of industry to developing countries. From such redistribution, a world production scheme, compatible with resource and environmental constraints can be derived Another type of model by the same group seeks to answer the question of the viability of Japan and its particular set of values in the context of the world model This model begins with the 56-sector input-output model and calculates the long-term outlook for the economy in a manner somewhat similar to the United States model Population does not play a very large part in the model, it appears to be conventionally defined and the linkages go only from population to demand

[42] Fundacion Bariloche, *op cit*
[43] Japan Work Team of the Club of Rome, *op cit*

Conclusions

42 This paper has presented the highlights of a number of models concerned with the interactions between population, resources and the environment It has dealt at length with the world models because of the considerable interest they have generated It has been argued that these models are generally under-specified and currently serve the purpose of calling attention to the global problems arising from population growth and possible limitations of natural resources The discussion has also covered a series of national models in which the interactions are specified in varying degrees of detail, but which do not consider the global problem at all Such models, most of which are still being actively worked upon, show promise of being able, eventually, to throw light on these interactions, particularly in the developing countries, where knowledge is very deficient Most models have a series of interactions from population to economics, but even here, when one gets into the questions of employment and income distribution, the answers and the relationships are far from clear Few models have the interactions that go in the opposite direction—from economics to population Yet these are the keys to a viable alternative for the vast mass of impoverished humanity.

43 It is clear that excessive rates of growth of population are an impediment to economic and material progress; and yet the conventional wisdom seems to say that unless there is economic advancement, population growth rates will not fall. Historical evidence shows the birth rate falling continuously as *per capita* income grows—this curve is embedded in the World 3 model In a completely specified world model, the key to global equilibrium would be the rate of decline of this curve, it is clear that the historical rate is much too slow to avoid widespread global misery. However, it is only through investigations, such as those which form an integral part of the Bachue system, that it will be possible to shed some light on this type of interaction and to discern which areas of it are amenable to policy

unused land, the production cost remains constant. But when all existing land has been occupied, a limit is reached beyond which the production of each additional unit can only be attained at a higher cost. A point is reached where an increase in the expenses no longer means a higher yield, and the limit of possible production would then be reached.

17. Ricardo's hypothesis, seemingly more applicable to non-renewable resources, does not necessarily imply a finite quantity of resources. It assumes that the economically more profitable resources will be used first and that less adequate ones will gradually be incorporated, as the former ones become depleted. As a result, the cost of production increases from the beginning of the exploitation until it reaches limits that make the exploitation socially unacceptable.

18. The MIT model combines both scarcity hypotheses. It incorporates Malthus' assumption that resources are limited and Ricardo's hypothesis of a diminishing return from the beginning of production. No wonder that this combination of the most negative elements of the two hypotheses results in a model that is easily explosive.

19. One may ask to what extent any of the two scarcity hypotheses can be applied to mineral resources. Taking into account the definition of "reserves"—the material that can be exploited under current economic and technological conditions—it is obvious that Malthus' assumption of a known fixed quantity cannot be applied. It would only have a theoretical meaning if it were assumed technology and economic conditions were constant. In this case, the total resources would be those which could be exploited under current conditions, and a sufficiently detailed exploration of all eventually accessible parts of the earth would make it possible to establish their volume exactly. Yet, it is meaningless to use the figures recorded in the inventories that are periodically published as representing the totality of the resources obtainable under current conditions on this planet. These figures only represent a fraction, possibly a very small one, of the total resources of this kind. Nevertheless, the basic difficulty in connexion with ascertaining the volume of the earth's total reserves is the fact that whether given material is being considered as a resource or not depends upon technological and economic conditions that va[illegible] with time. Since these conditions cannot be foresee[illegible] t for th [illegible] near future, the total quantity of [illegible] available to mankind is intrin[illegible]

20. Ricardo's hypothesis, a[illegible] to be better adapted to mi[illegible] [illegible] to apply. Even if [illegible] ions are presup[illegible] [illegible] lly most con[illegible] place woul[illegible] of the locat[illegible] urces th[illegible] dition[illegible]

which were easiest to locate and those which were, at that time, nearest to the production centres, this having nothing to do with the economic "quality" of the deposits. For instance, the European iron-ore deposits with relatively low iron content began to be exploited before those of Lake Superior with their high-grade ores, simply because the industrial revolution began in Europe and reached the American continent later.

21. However, it is when technological change is introduced that it becomes apparent that Ricardo's principle cannot even be formulated in an intelligible manner. In fact, each technological advance modifies the criteria that have to be used in order to ascertain which resources are most advantageous from an economic point of view. A few decades ago, the most convenient manner for obtaining nitrogen compounds for fertilizers was to extract them from the deposits of natural nitrates. Now they are produced from the nitrogen in the atmospheric air. Is there any sense in asserting that there has been a transition from a resource that was more convenient, from an economic point of view, to another that was less convenient. The same thing can be said about the changes in the type of resources used to produce other raw materials of mineral origin, due to the technological advances that have taken place since the beginning of the industrial revolution.

22. The effects of the treatment of the production function in the Meadows model and in other models under construction are not obvious to a similar degree, but they are also potentially catastrophic. In these models, a production function (3:1) without substitution issued on the assumption that, historically, the scarce element has always been capital. This assumption does not take into account the fact that in developing countries the rate of capital formation is very slow with respect to the growth rate of the population. The result is that, if it is not assumed that the surplus labour force can generate capital, which is absolutely contrary to historical experience, the rate of employment grows very slowly, maintaining a high level of unemployment. This hypothesis has been verified in the Latin American model, which includes sectoral production functions with substitution elasticity. Runs were made in which the production function coefficients remained constant with respect to current values. As can be seen, the Meadows model has very sound reasons for showing "counter-intuitive" behaviour patterns.

The population problem in models

[illegible] ork, Carter points out that in all the [illegible] oomsday" models, population in[illegible] ic system, but not inversely. In the [illegible] c cycle is complete, but very [illegible] in a typical model, a projection [illegible] covering, as a rule, a period [illegible] procedure is justified on the [illegible] the nature of population [illegible] is relatively small for such

24 However, the necessity of designing models in which population is a variable, depending upon endogenous socio-economic variables, does not reside in the need to obtain quantitative results that are more exact than in projections, but in the need to know which factors influence population evolution. This is fundamental because many of these models are being used to recommend birth-control policies without giving any explanation of which factors really bear upon birth rates. As a result, they usually end by recommending investments in family planning or contraceptive measures, both of which have greatly differing effects at different times and in different cultural environments, and are, as a rule, inefficient

25. The Latin American model is a good example of a new point of view. It includes a submodel with more than ten socio-economic variables which determine population calories and proteins *per capita*, housing shortage, literacy, urban population, rural population; economically active population in the secondary sector, economically active population in the primary sector, etc All these variables are endogenously generated by the model, making it possible to determine how the population evolves in relation to the changes in the basic socio-economic variables The model has already been tested, using historical series, and the results were remarkably exact The adjustments obtained in the population variables are life expectancy at birth (0 94), birth rate (0 82), crude death rate (0.83).

26 It is also necessary to point out, even though it seems superfluous, that, in a world-wide model or in a model comprising large areas, especially in the developing countries, it is necessary to use for the *population sector, as well as for the other sectors,* indicators or variables the meaning of which is as clear as possible and on which adequate information is available Some models contain such variables as crowding, investments in family planning and availability of medical assistance, which satisfy none of these conditions Crowding varies immensely within each country and even if it is multiplied by an income indicator, it is very difficult to endow it with any genuine quantitative significance Investments in family planning have been applied in few parts of the world and for too short periods of time to permit the drawing of valid conclusions Furthermore, it is known that their results vary greatly with cultural conditions. As for the availability of medical assistance, in the tests made with the Latin American model, this indicator proved to be practically irrelevant in comparison with the aforementioned socio-economic indicators

Concept of equilibrium of the ecosystem

27. The idea of equilibrium in ecosystems is one of the most vaguely used concepts in a large part of the abundant literature on contemporary problems When introduced into mathematical models, this concept does not increase its precision, even if quantified, but becomes much more dangerous. It is quite usual now to forecast, as is done in the MIT model, the "collapse" of the ecosystem within a relatively short time.

28 In this respect, it should be borne in mind that

(*a*) No ecosystem of any importance has ever—in the entire history of the earth—been in equilibrium, otherwise, the evolution of life would have been impossible There are many possible states of equilibrium, and it would perhaps be more correct to speak of a series of states of equilibrium or of a "general direction of equilibrium" rather than of a single stable state;

(*b*) There are so many variables involved in a natural ecosystem, their quantification is so difficult and so little is known about their detailed behaviour that there is still no "complete" ecological system (in fact, the only ecological system that can properly be defined as such is the biosphere) whose representation by a mathematical model has been possible;

(*c*) For all these reasons, there is a tendency to underestimate the ability of the ecosystem to adapt itself to the influence of the disruptive factors introduced by mankind.

29. This does not imply a denial of the fact that many of the values of modern society are intrinsically destructive for the environment, but much more investigation is required before this effect can be quantified and introduced in mathematical models These can be very useful in showing which patterns of development have the least disruptive effects on the human and natural environment and, at the same time, which tend to fulfil the most fundamental needs of society

Projection models *versus* normative models

30 A great many of the population-resources-environment models—and especially the Doomsday models—are merely projections and are implicitly based on the assumption that mankind's current tendencies are practically unchangeable. Historically, and particularly during the past two or three centuries, the fate of mankind has never been fixed in an unequivocal manner. In the face of global problems, there have always been sufficient degrees of freedom to allow for different alternative solutions. The chosen solution depends always upon the chooser's position in a concrete social, economic and political situation

31. When Malthus propounded his theory of scarcity —the scientific basis of which was neither better nor worse than that of current Doomsday standpoints—the "solution" he postulated was not the only possible one, as has been proved by subsequent historical events and by Marx's refutation, which came relatively shortly after Malthus. It is clear that Malthus' position was the one that suited the interests of the governing classes of England Marx's refutation does not so much derive from a different appreciation of "reality"—it being hardly more than a theory with very loose [illegible]irical foundations—as from a [illegible] the forces that determine the e[illegible]

32. The current situation is very similar. Even if it is assumed that the current course of mankind might produce the collapse or serious disturbances in the natural ecosystem, it does not mean that there is one single solution for the avoidance of such risks. Owing to the enormous complexity of social organization, in conjunction with the progress of science and technology, the degrees of freedom at the disposal of the "human system" are now much greater than in Malthus' time.

33. The catastrophe forecast by many models now in fashion (mathematical or others) is the everyday fate of a large part of mankind. Hunger, illiteracy, premature death, lack of adequate housing etc.—in other words, wretched living conditions—constitute the common fate of the majority of the inhabitants of the developing countries. It is not necessary to wait 80 or 100 years for this catastrophe to be perceived, or for the effects of the depletion of natural resources or of increased pollution to be felt in the large centres of the developed countries.

34. The obstacles to an adequate development of mankind are not so much material, at least not for the foreseeable future, as socio-political; and they depend upon the current distribution of power at the international level as well as within each country. This is revealed in the growing international gap, as it is in the gap within countries, particularly the developing countries.

35. If these tendencies should persist, mankind will suffer a real disaster long before any limitations in the ecosystem become perceptible. The growing pressure of the "marginal" masses will most probably cause the breakdown of the international system through a series of conflicts on a continental scale. The current situation of the world and the events of recent years leave little room for doubt on this subject.

36. The foregoing statement is not meant to deny the fact that, if mankind's behaviour continues along current trends, the degradation of the physical environment may become a very serious problem. It probably will not take the form of a complete depletion of non-renewable natural resources or of a lethal increase of pollution. However, the problem of uncontrolled urban agglomerations and of the general deterioration of the environment, generated by a culture the sole aim of which appears to be to increase the consumption of material goods up to irrational limits, can give rise to living conditions that are almost as disastrous as Malthus' scarcity.

37. A simultaneous consideration of the two basic problems now confronting mankind—internal chaos and degradation of the physical environment—makes it possible to redefine the concept of the human ecosystem. It has generally been defined as the physical environment in which mankind is inserted. There is a tendency to handle the concept as if there were two relatively independent but interrelated systems. It is assumed that the internal relationships of the human "system" have little to do with the physical environment.

38. However, the truth is that the influence exerted by mankind on the physical environment basically depends upon the social organization it adopts and upon the system of values sustaining it. A large part of the values of contemporary society are intrinsically destructive for the ecosystem, just as they are destructive for man himself, through a continuously increasing alienation. Mankind and the physical environment in which it is inserted constitute, thus, a single system, which can only be described by using social and physical variables.

39. In the current state of affairs in the world, the developed countries, being the beneficiaries of the global system, seek solutions that do not affect the social organization and the system of values on which this privileged situation is based. Reverting to the concept of ecosystem that was mentioned before, it is tantamount to making fixed constants of all the social variables. The system becomes determined by the physical variables, which are also assumed to be essentially constant. Consequently, "fatalistic" solutions make their appearance, based on the fundamentally static nature of the ecosystem, which is why there is so much talk about the inevitable breakdown of the state of equilibrium of the ecosystem, no account being taken of the obvious fact that there are many possible states of equilibrium.

40. Mere projection models can, therefore, scarcely be of any assistance in the solution of contemporary problems. It is necessary to design normative models which, by exploring all possible degrees of freedom in the complex mankind-resources-environment relationship, seek solutions that are not simply "crystallizations" of the current situation, perpetuating the advantage of privileged minorities.

Part Six

POPULATION AND THE FAMILY

CULTURAL DEVELOPMENT, POPULATION AND THE FAMILY*

*Steven Polgar***

1. Families, however one may wish to define them, are one of the most important institutions in human society In explanations concerned with population dynamics, family types and family processes are often considered to be a crucial intervening factor between larger social units and natality In this paper, the greatest emphasis is placed on the way changing socio-economic forces affect both family units and changes in population phenomena related to the way families function.

2 The first section of this paper is primarily concerned with three functions that are often associated with families· the sharing of subsistence activities in a small group (from two to not much more than 20 persons), explicit or implicit rules concerning permissible and prohibited partners in sexual intercourse, and joint care for and socialization of children

3 Certain common assumptions about families have only recently been brought into question Particularly confusing, when one wishes to look at this institution in a cross-cultural perspective, is the ethnocentric assumption that a single boundary will contain certain kinds of kinship behaviour, that the people within this boundary will form a co-residential unit (i e., live in close proximity to one another), and that they will also be "normally" the only ones to perform certain household functions, such as cooking, childbearing and sexual cohabitation This problem is discussed below in more detail (see paras 27-32)

4 Family forms, natality and mortality levels, child-rearing practices and the outside forces affecting the family changed in various ways during social evolution. To divide human history into a "traditional" past and a "modern" future is to distort reality in the grossest way The second and longest section of this paper is devoted to describing the relationships between society and the family, and between the family and reproductive patterns during the major stages of human evolution

5 The last section of the paper briefly reviews some of the social policies that affect families and reproductive behaviour, comments upon the position of women and alludes to the implications for the future of the commune as a family form

THE FAMILY AS A HUMAN INSTITUTION

Joint subsistence

6 If any one symbol can be chosen to best represent the family, it is the hearth or the common cooking-pot In the duo-local residence pattern, where the husband remains in the household of his maternal kin and the wife in the household of hers (found among the Ashanti of Ghana), the wife will cook for herself and her children at her house and also send some of the food to her husband The invitation to join the group eating a common meal is, in many cultures, both the most frequent and the most important form of hospitality towards one who is not normally a member of that group In gathering-hunting bands, where many activities, such as large-scale hunts, caring for children and death rituals, are carried out by the entire band, food is very often divided up and cooked by smaller units which—for this and other reasons—can be considered families Conversely, when large groups routinely eat in dining halls, as in labour camps, colleges or prisons, an observer will immediately know that "family life" does not exist in such a setting

7 In societies based on the production of food rather than gathering and hunting, the family is often one of the most significant work teams and property-holding units When lineages are present, as is the case in many independent village agricultural societies, rights to land will be held by the entire lineage, but particular fields or gardens will be assigned to smaller family units, which will then work them co-operatively and have rights in the products thereof. In feudal societies, the peasant family is very clearly the basic unit of production Of course, there may be institutions such as "work bees", where the raising of a building or the preparation of a large feast provides an occasion for joint work by persons from many different households. But most productive activities will be carried out by the same group of people who also share rights in land, owe common obligations to the overlord, occupy a single cluster of buildings (set apart from other similar clusters) and jointly use many other material objects as well. The decline in the importance of the family in industrial societies, by the same token, is often attributed to the fact that husbands and wives and other members of the family group no longer "gain their livelihood" by participating in the same unit of production.

* The original text of this paper (E/CONF 60/SYM II/3) [illegible]

** [illegible]

8. Enduring sexual bonds between males and females are found among many vertebrates, not just humans. To trace the origins of the human family to sexual bonds, as some others have done, would thus be erroneous. But with the emergence of speech, elaborate sets of symbols and culturally transmitted social rules of behaviour, the patterns of mating described as monogamy, polygyny, polyandry, group marriage etc., are no longer species-specific or group-specific behaviour, but uniquely human cultural patterns.

9. Sexual behaviour is regulated by social rules in all human societies. These rules encompass rituals of transition to adult status, courtship patterns, mate selection, number and classification of marriage partners, degrees of tolerance and prohibition concerning extramarital sexual behaviour and proper and improper times for coitus. Such rules, furthermore, have considerable influence on the pattern of reproduction.

10. Puberty quite frequently occurs after mate selection has already taken place. The degree of emphasis on the puberty transition, what sorts of sexual behaviours are permitted before it and whether it is performed as each girl achieves her physiological menarche or is done for entire age sets, can influence the timing of the first birth. Whether sexual intercourse is permitted during courtship, and between which partners, has similar consequences. Transition ceremonies for males may also be relevant, as in the instance of the Gikuyu, where only a kind of bundling is permitted during the courtship period, while the boys are waiting for their "graduation" into the young men's age set. [1]

11. Mate selection is an extremely important process, which includes incest rules and exogamy rules, as well as preference rules for certain types of kin. Among the many theories concerning the origins of incest, one is of particular interest in the context of this paper. This hypothesis is that parent-child incest originated due to the low statistical probability in early human evolution that parent and child would be simultaneously in the reproductive age, and that, based on the Arensberg principle that norms follow action, rules specifying that another type of mating is to be sought would follow upon the very high probability that other than parent-child matings would in fact occur. [2] Matings between siblings and cousins among non-human primate troops are, of course, quite possible. In gathering-hunting bands of humans, interband exchange of members became ecologically advantageous and, eventually, normatively prescribed. As band exogamy arose, sibling-sibling matings became infrequent.

12. After the development of agriculture, local group size increased and its membership became more stable. With the establishment of lineages holding property in common, systematic linkages between these descent groups came to be solidified through preferential marriage systems, e.g., of cross-cousins. Prescriptive cross-cousin marriage, however, implying that all marriages are to be so contracted, is demographically most improbable, given the birth and death rates which prevail in these societies. [3]

13. With social stratification, class and caste endogamy appeared. Furthermore, as is discussed more fully below, States tend to take over the regulation of sexual conduct, which helps to weaken the power of lineages. [4] After industrialization, many endogamy and exogamy rules become less important (with the exception of incest, about which the State continues to be concerned), and romantic love and personal compatibility emerge as important factors in mate selection.

14. The more restrictions placed on eligible mates, the more likely it is that the search for a suitable partner could delay the contracting of a marriage. In some societies, as in India, it is customary to guard against this contingency by beginning the mate-selection process long before puberty, and sometimes even before the birth of a son or daughter to the prospective in-laws. Conversely, when mate-selection rules are very relaxed, as in industrial societies, age of marriage can fluctuate rapidly in response to temporary factors.

15. Certain types of marriage patterns have been the subject of considerable research and debate with respect to their demographic effects. With polygyny, the preponderance of the evidence now favours the conclusion that it tends to reduce natality, at least in Africa, where it makes adherence to rules concerning long periods of post-partum abstinence more feasible. [5] Polygyny can also affect the age at marriage and the age differential between mates. When the incidence of polygyny is high, it is likely that girls will be married at a young age and often to older men; by the same token, young men may remain celibate for a long time, carry on extramarital affairs with—and often marry—older women as the first wife, all of which might lower average natality. Frequency of divorce, length of time between marriages and probability of remarriage can all affect the proportion of the reproductive period during which a woman is not exposed to pregnancy. Matrilineal descent [6] and the West Indian visiting type of conjugal relationship [7] are examples of marriage systems conducive to more frequent dissolution of unions and

[1] J. Kenyatta, *Facing Mount Kenya: The Life of the Gikuyu* (London, Secker and Warburg, 1938).

[2] M. K. Slater, "Ecological factors in the origin of incest", *American Anthropologist*, December 1959, pp. 1043-1059.

[3] P. Kunstadter and others, "Demographic variability and preferential marriage patterns", *American Journal of Physical Anthropology*, December 1963, pp. 511-519.

[4] Y. A. Cohen, "Ends and means in political control: state organization and the punishment of adultery, incest and violation of celibacy", *American Anthropologist*, August 1969, pp. 658-687.

[5] V. R. Dorjahn, "The factor of polygyny in African demography", in W. R. Bascom and M. J. Herskovits, eds., *Continuity and Change in African Cultures* (Chicago, University of Chicago Press, 1959), pp. 87-112.

[6] F. Lorimer, *Culture and Human Fertility* (Paris, UNESCO, 1954).

[7] M. Nag, "The influence of conjugal behavior, migration and contraception on natality in Barbados", in S. Polgar, ed., *Culture and Population* (Cambridge, Mass., Schenkman, 1971), pp. 103-123.

marked variations in the frequency of exposure to sexual intercourse.

16 The suitability of different types of contraceptives may also be affected by the prevalent type of marriage For example, in the nineteenth-century Victorian pattern, where the wife is not supposed to experience any pleasure during the sex act and the husband obtains his pleasure in extramarital settings, the use of *coitus interruptus* between the married pair is not too troublesome In the Mediterranean conjugal relationship, the condom, being strongly associated with premarital and extramarital affairs, is not a suitable method to be used between husband and wife. [8]

17 Coitus before marriage and outside of its bounds is important when it circumvents some of the natality-reducing effects of marital patterns which would otherwise delay the age of first childbirth and lengthen periods outside of a sanctioned conjugal union Recent trends in the United States of America, for example, show that a very large proportion of first marriages, particularly among couples under the age of 20, occur when the bride is already pregnant Many extramarital liaisons, on the other hand, have a greatly reduced likelihood of contributing to natality because abortion and contraception would tend to be frequently used Prostitution is important when marriage age for men is late, with long absences of husbands in labour camps and with some of the other aspects of the early stages of urbanization

18. Times when sexual intercourse is deemed proper or improper are commonly prescribed in many different cultures Beliefs, based upon the observation of oestrus in animals, that fecundability is highest just before and/or after the menstrual period, which was the dominant idea even in medical circles until Knauss and Ogino discovered it to be otherwise, would influence couples to have intercourse at these times if they desired a pregnancy, or to avoid them if they were not intending to have another child Before hunting or raiding expeditions, before and during religious observances and during the late stages of pregnancy, abstinence is commonly prescribed Mention has already been made of the post-partum abstinence period, which was found to be significantly correlated with natality levels in Nag's ground-breaking cross-cultural study. [9]

19 In some societies, as a couple grows older intercourse becomes less and less frequent and may even cease well before the end of the wife's reproductive period On the Indian subcontinent, it is also considered shameful for a woman to become pregnant when her daughter-in-law is in the house and is beginning to bear children herself. Sexual intercourse may be encouraged in connexion with some phases of the agricultural cycle, during early pregnancy, at the time of certain religious festivals and during the immediate period after the wedding (e g, the so-called "honeymoon" of Western societies).

20 In sum, it may be observed that while the regulation of sexual activity is certainly not the foundation upon which the human family originated, nor its most important aspect, its various forms are important both for the relationships of the family to larger units of society and to demographic outcomes

Socialization of children

21 The human infant is born at a much earlier embryological stage of development than is the case for other mammals Such a biological change presupposes an arrangement by which new-borns and infants will be given a very large amount of care The immaturity of the new-born also permits a great deal more learning to take place in the context of social relationships than in other mammals

22 In contrast to many birds and lower vertebrates, the involvement of the human male in "parentalism" is not biologically determined, [10] and thus the degree of involvement of the father (as well as of relatives other than parents) in the socialization of children is highly v riable In gathering-hunting bands, the older children are often left to play by themselves, under the general supervision of members of the grandparental generation and others who remain behind in the camp while adults go out to collect food When the camp is moved, the women carry both the larger part of the group's material possessions and the infants, which has important implications for the optimal spacing between births [11]

23 In agricultural groups, toddlers are often placed under the supervision of older children, while infants are carried on the woman's back or placed on cradle-boards or similar devices near the place where the mother works So-called "extended family" households permit a great deal of co-operation in child-tending between sisters, co-wives and other related female members (But such co-operation among relatives or non-relatives is also common in gathering-hunting bands and poverty neighbourhoods in industrial cities)

24 The age at which children assume responsibilities in the area of subsistence activities tends to be lower in peasant societies than among gatherer-hunters, which reflects the external pressures on the household unit through rent, labour demands and taxes. Corresponding to the degree to which gender division of labour is emphasized, children begin to associate with male or female relatives, respectively, learning to take on adult responsibilities

[8] S Polgar, "Cultural aspects of natality regulation techniques", *Proceedings of the Eighth International Congress of Anthropological and Ethnological Sciences* (Tokyo, Science Council of Japan, 1969), vol 3, pp 232-234

[9] M Nag, *Factors Affecting Human Fertility in Nonindustrial Societies A Cross Cultural Study* Yale University Publications in Anthropology, No 66 (New Haven Conn, Yale University Press, 1962)

[10] E W Count, "The biological basis of human sociality", *American Anthropologist* December 1958, pp 1049-108[illegible]

[11] R W Sussman, 'Child transport, fam[illegible] size, and [illegible] in human population during the Neol[illegible] *pology*, April 1972, pp 258-259.

25. Specialists for the education of the young first appear in feudal societies, where their pupils will be drawn only from the upper classes. The institution of the public school emerges for the first time in industrial and late-colonial societies. Schools characteristically stress enculturation into the national society (or, in colonial settings, into the culture of the metropolitan society) at the expense of ethnic subcultures. Thus, not only is the socialization of children removed from the family setting, but the State can design curricula based upon the ideas of power-holders concerning the best interests of the country.

26. Schools differ from other types of learning situations by their predominant emphasis on verbal and written means of teacher-pupil communication, as opposed to imitation and guiding the learner's motions by direct physical contact. An interesting exception, however, to the latter kind of learning in societies that do not have schools, is the instruction given during puberty ceremonies. Along with many other practical and ritual matters transmitted at this time, the initiates may also be told about contraceptive and abortion techniques.

Problems in the definition of the "family"

27. Since such a large part of the social science literature on the family originated recently in the United States and in Western Europe, it is not surprising that it should be tainted by severe ethnocentrism and chronocentrism (the bias of looking at all historical epochs from the point of view of one epoch, such as the present). Since the "family" in late nineteenth- and twentieth-century Western societies represented a co-residential unit, composed of people closely related by marriage and descent, and the largest part of the domestic functions of child-rearing, eating, money-sharing and the like were performed within this co-residential group, the three separate elements of co-residence, domestic functions and intimate kin behaviour were conceptually amalgamated as "normal" components of "family" behaviour. When patterns were described, both within Western society and outside of it, which did not combine these three separate areas of behaviour, they were considered deviant and/or curious. But from a cross-cultural and historical point of view, it may be preferable to analyse these three domains separately, rather than assuming that they "normally" belong together in the same institution. [12, 13] Biological factors certainly do make it preferable that a mother and the infant she is breast-feeding reside in close proximity. But even in this respect, suckling by several women or hiring a wet-nurse is possible. There is also no need, as is illustrated above, for the husband to reside under the same roof as the wife, or for completely weaned children to remain with their mother. Sexual intercourse can—and does—take place in many other places besides the one where the wife sleeps.

28. The intimate relationship between the mother and her children does indeed condition this to be the closest kinship found in all societies; adoption, however, can lead to an equally close relationship, despite the absence of the biological bond. In many societies, the second closest bond is not between husband and wife, but between siblings, particularly those of the same gender. With matrilineal inheritance of property held by males, there is an inherent conflict between the married pair, to the extent that the husband's loyalties are split between his own children and those of his sister, and a wife might indeed frequently importune her husband to give presents to "her" children while he is alive and not let all his valuables remain for his matrilineal kin after his death. Mention has previously been made of the high frequency of divorce in matrilineal societies.

29. The dichotomy between "nuclear" and "extended" households is neither as simple nor as fundamental as most Western-trained social scientists would make it appear. In societies where the continued residence of the family head's children, with their spouses and own children, in the parental home is an expressed ideal, only a minority of households are found in fact to have such a structure. [14] Of course, a separate residential location for an elementary family of husband, wife and their children does not mean that other relatives may not be highly significant in helping to raise the children, giving and receiving money or gifts, or influencing decisions related to family planning.

30. Increasing numbers of people in industrialized and colonial societies spend considerable portions of their lives in such settings as dormitories, barracks or labour camps, which are not "familial" residential arrangements at all. There are precedents for this, of course, in the monasteries of Christianity and Buddhism, not to mention the camps for warriors-in-training in the Zulu kingdom or the Ottoman empire. Servants and lodgers residing in households—also a pattern predating industrial society—are yet another phenomenon complicating the nuclear-extended dichotomy.

31. The novelty of the school as an institution for the socialization of children has already been commented upon. Other institutions in industrial societies that perform domestic functions include restaurants, hotels, house-cleaning services, baby-sitters, hospitals, old-age homes and visiting nurses. Many domestic functions were performed in pre-industrial societies, too, in locations other than the primary residence of family members. Not only did children, for example, move around to the residence of different kin, but many relatives and neighbours were free (and often indeed responsible) to nurture, instruct and sanction children in a number of

[12] D. R. Bender, "A refinement of the concept of household: families, co-residence, and domestic functions", *American Anthropologist*, October 1967, pp. 493-504.

[13] J. N. Riley, "Family organization and population dynamics in a central Thai village", unpublished doctoral dissertation, Department of Anthropology, University of North Carolina at Chapel Hill, 1972, pp. 11-27.

[14] T. R. Burch, "The size and structure of families: a comparative analysis of census data", *American Sociological Review*, March 1967, pp. 347-363.

"outdoor" settings. Few societies go so far as the Nyakyusa in having young people move out to form separate age-villages; [15] but peer groups have been of immense importance in helping children acquire physical, social and ideational patterns relevant to their culture. Food preparation, for social and ritual occasions, very often takes place outside of the family cooking-pot, and sexual liaisons—as mentioned above—occur frequently outside of conjugal unions

32. All of these complexities should serve to caution the investigator interested in making generalizations about population phenomena relevant to the entire human species. Co-residential units are indeed an important locus for conjugal relationships including coitus, for childbearing and for the socialization of children, but it is singularly dangerous to equate them with two or three family prototypes, each of which is supposed to have particular characteristics relevant to demographic phenomena

THE FAMILY IN HUMAN EVOLUTION

33 Some allusions have already been made to differences between human families and social congregations of other vertebrates, and to varieties of family forms at different stages of human evolution In this section, productive activities, socio-political patterns, family types and reproductive behaviour are reviewed in a systematic historical sequence.

34 The dichotomy between "traditional" and "modern" types of societies and families, so often employed by demographers, sociologists and other writers, must be emphatically rejected as inappropriate to a scientific endeavour hoping to encompass all of humanity The term "traditional" invokes a "mixed bag" of social patterns, which would include eighteenth-century French peasant homesteads with Australian aborigine bands, and plantation shacks in Santo Domingo with the shogun's palace in Tokugawa, Japan By the same token, "modernization" often denotes nothing more than the process by which third-world countries are supposed to be remade in the image of twentieth-century middle-class patterns in the United States of America There may also be a further implication that this "modern" state of affairs is some kind of inevitable millennium, rather than a brief (say, 150 years) and largely aberrant incident in human history.

35 Reviewing the development of the human family in an evolutionary perspective has the further advantage of giving a proper place to the biological substratum of human society, which developed during the period of at least 2 million years while human subsistence was based on gathering and hunting One must also be aware, however, that many conclusions about the evolutionary past are based on inferences from contemporary peoples and living non-human primates. Ecological considerations, and occasionally the evidence of archaeological research, can be used to buttress these inferences. This warning is not constantly repeated as the historical reconstruction is sketched out below, but it should be kept in mind.

Non-human primate troops

36 Monkeys and apes, with the exception of lactating infants, obtain all the food-stuffs they consume on their own, in other words, there is no sharing of food. The social cohesion of troops is thus not predicated on food-getting, neither is it based upon sexuality, since one can find instances of troops made up entirely of young males or of females and young. Probably the single most important reason for banding together is defense against predators The most common composition of troops is one or more adult males, and a number of adult females, juveniles, immatures and infants

37 There is a great deal of variation in the ecological adaptation of different primates, but a fundamental difference obtains between tree-living and ground-dwelling species Sexual dimorphism and the size of the home range tend to be much greater among terrestrial groups Field-studies of baboons, mountain gorillas and chimpanzees conducted in the past 15 years have been particularly instructive [16] Most of their diet consists of fruits and vegetables, and the troop exploits a relatively restricted domain, usually called the home territory Agonistic displays, both within and between troops, can occasionally be observed, but dominance behaviour (including hierarchies) serves to keep the situation generally peaceful Individuals will occasionally shift from one troop to another among the baboons and gorillas, among chimpanzees the situation is considerably more fluid

38. In most species of large primates, contrary to previous evidence, which had been based on studies in zoos only, there is a definite period of heightened sexual activity and a birth season [17] During the period of lactation, the mother does not engage in coitus Population density in situations where there has been no human disturbance of the environment is well below the carrying capacity. Immature primates engage in a great deal of play behaviour in peer groups, improving their motor skills in the process Infants are at first tended only by their own mothers, with gradual participation of other females and occasionally males Then, there is a very gradual process of social separation coincident with weaning Except for gibbons, where for a part of the annual cycle a male and a female and some young will remain in steady association, social units resembling the human family are generally absent

Gathering-hunting bands

39 In contrast to almost all non-human primates,

[15] M Wilson, "Nyakyusa age-villages", in S and P Ottenberg eds., *Cultures and Societies of Africa* (New York, Random House, 1960), pp 227-236

[16] See I DeVore, ed., *Primate Behavior Field Studies of Monkeys and Apes* (New York, Holt, Rinehart and Winston, 1965)

[17] J B Lancaster and R B Lee "The annual cycle in monkeys and apes", in I DeVore, *op cit*

who will make their daily rounds together and often shift each day among several preferred sleeping locations, gathering-hunting bands establish a single home base which they occupy for weeks or even months at a time. From this home base, different subunits of the band will usually disperse to pursue varied food-getting activities; often, males will range further away in pursuit of game, while females and some youngsters collect vegetable products at lesser distances from the camp. Some individuals, including the old and many of the children, will remain in or near the camp a great deal of the time. Adults also may remain behind, for example, to work on tools, to rest or to engage in curing activities.

40. The transition from the twigs and stones occasionally used as implements by some monkeys and apes, to the tool-making and tool-using among humans is often considered the most important behavioural step in hominization. Bipedal locomotion, which may well have been encouraged by tool-using, is the anatomical criterion used to classify fossils as human. Consumption of meat is also a very important human characteristic (reflected in dental structures), although non-human primates occasionally eat insects or immature birds and mammals. Vegetable products still make up the largest part of the calories in the diet of all but the most exceptional gathering-hunting bands. [18]

41. Human reproductive physiology differs from that of most other mammals in three significant ways. First, among humans there is neither the annual (nor semi-annual) period of heightened sexual activity; nor—as a consequence—a definite birth season. Births are not evenly distributed throughout the year, but seasonal fluctuations in contemporary societies are relatively small and differ considerably from one place to another. Secondly, both sexual intercourse and impregnation can occur while a human female is lactating—a change which may have taken place at about the same time as the acquisition of a fully bipedal gait. [19] Thirdly, with an increase in the entire life-span, not only the gestation period, but the length of the human reproductive period, became longer. Taken together, these changes produced a situation where birth intervals in *homo sapiens* could become as short as 10 or 11 months, and the number of children born per average woman in a group could reach approximately 12, which is the Hutterite maximum.

42. However, except for those periods during which human population expanded over every continent except Antarctica, population increase during the Pleistocene seems to have been negligible. Given the possibility of doubling population size in every generation, even before the advent of modern public health and medical techniques, and given the universality of deliberate natality regulation in all cultures described, the inference that infanticide, abortion induction and contraception were invented quite early in human evolution appears to be reasonable. [20] The most likely efficient cause for these natality-regulating practices among gathering-hunting people is the difficulty of transporting more than one child unable to walk when the band is moving from one camp site to another. [21] The effect of these practices has been that population densities among contemporary gathering-hunting societies are considerably below the carrying capacity of the environment. [22]

43. In gathering-hunting bands, the camp site is divided up into dwelling-places occupied by such family units as a conjugal pair with small children, an older couple whose children are grown, an older person with an adolescent or an older person alone. These subunits will have cooking-fires of their own, but both uncooked food-stuffs and prepared comestibles are passed back and forth in elaborate systems of reciprocal exchange. The composition of a particular camp is in a constant state of flux, with people shifting their residence quite frequently. In some groups, there are seasonal shifts between larger and smaller aggregations; and at the point when the smaller groups reassemble into the larger ones, there can be a considerable change in the overall composition of the bands. [23] Work teams are rarely made up of the persons who eat food cooked on the same fire; rather—unless the entire band takes part in an organized activity such as a collective hunt—they will be composed of persons (usually of the same gender) who want to engage in a particular activity and find one another's company congenial.

44. Taking care of youngsters, to the small extent that they are not taking care of one another, is apparently the responsibility of any adults who may be in the vicinity at the time, as mentioned above. The assumption of adult responsibilities does not take place until well into adolescence. Marriage tends to be exogamous in the sense that close relatives and members of the same or adjacent band are discouraged from marrying one another. [24] Lineages for reckoning descent in mate selection occur and are very highly elaborated among Australian aborigines. These lineages, however, are not the basis for organizing work teams, and they do not have exclusive use-rights in productive resources. Rather, their primary purpose seems to be to link distant groups together to facilitate the sharing of resources; in Australia, there is a strong correlation between the harshness of the environment and greater elaboration of the marriage selection system, forcing

[18] R. B. Lee and I. DeVore, eds., *Man the Hunter* (Chicago, Aldine Publishing Co., 1968), pp. 23-95.

[19] J. B. Birdsell, "Some predictions for the Pleistocene based on equilibrium systems among recent hunter-gatherers", in R. B. Lee and I. DeVore, *op. cit.*, pp. 229-240.

[20] S. Polgar, "Population history and population policies from an anthropological perspective", *Current Anthropology*, April 1972, pp. 203-211.

[21] *Ibid.*, p. 206; and R. W. Sussman, *loc. cit.*

[22] R. B. Lee and I. DeVore, *op. cit.*, pp. 229-249.

[23] C. M. Turnbull, "Demography of small-scale societies", in G. A. Harrison and A. J. Boyce, eds., *The Structure of Human Populations* (Oxford, Clarendon Press, 1972), pp. 283-312.

[24] *Ibid.*, p. 302.

people to search for mates further away in proportion to the undependability of local rainfall.[25]

Independent villages

45. The most significant turning-point in human history occurred when subsistence came to be based on the production of food from domesticated plants and animals. The transition to food production was a gradual process, preceded by an increased tendency to exploit smaller niches in an intensive fashion. The linkage of several of these niches seems to have been of particular importance; seasonal shifts in exploiting adjacent environments, transporting seed from one type of terrain to another and trade relations were particularly important in this process. There were at least three widely separated foci where this transition took place, each involving a different set of domesticates.

46. Various methods of reconstructing population change coincident with the transition to food production indicate that human numbers may have grown by as much as a hundredfold in a period of a few thousand years.[26] Considerable segments of the ecosystem were altered to produce materials for human consumption Thus, it may be appropriate to refer to the "supportive" capacity (instead of the "carrying" capacity) of the environment once human inputs changed the soil, the species of plants and animals, trophic relationships and transported materials from one location to another Given the vastly increased supportive capacity then, the range of densities of human populations that have been observed during the independent village phase still remain very much below the maximum.[27] With this greater degree of sedentariness it was also no longer such a problem to have more than one infant per mother alive at the same time [28] Children are given tasks contributing to production, such as keeping birds and other animals away from newly planted fields, weeding, tending flocks and taking care of younger children when the mother is busy

47. Once the economy of a region was transformed to food production, population-stabilizing tendencies presumably became more pronounced One of these tendencies was the maintenance of socio-political distance between villages Intergroup raiding, while not unknown, was relatively rare among gatherer-hunters In agricultural villages, particularly at the centre of groups expanding into an unused area and at the periphery of groups advancing against other peoples, raiding is quite common.[29] Characteristic of hostilities at this stage of [illegible]

has defeated several others, and perhaps chased their inhabitants away, will eventually acquire enough enemies who will join together to restore the balance of power. Villages, as well as lineages, which become too large for the effective organization of agricultural pursuits (and/or the organization of cohesive social relations under the leadership of two or three temporary task-leaders) will split up into smaller units

48 Natality-regulating methods already common among gathering-hunting people, such as infanticide, abortion and contraception, will be found among many agricultural people as well. The cross-cultural distribution of the long period of post-partum abstinence [30] indicates that this practice may well have emerged after the transition to food production.

49. With a greater degree of sedentariness and the presence of several kinds of domestic animals in close contact with the human population, the epidemiological factors influencing mortality changed considerably [31] The cumulation of human wastes and the presence of alternative domesticated hosts for pathogenic organisms facilitated the adaptation of a number of disease organisms to humans, for example, the shigella and salmonella groups of bacteria Cutting down the forests also facilitated the spread of infections for which insects act as intermediary hosts, such as malaria, relapsing fever and sleeping-sickness Some of the diseases found among contemporary village agriculturalists, of course, were brought to them with the expansion of state and colonial societies, it is plausible to assume, however, that many of the human diseases that have the ecological characteristics described did develop in the village-agriculture phase of evolution Endemic mortality, furthermore, was probably of greater importance than raiding in reducing the maximum rate of population growth, because endemic diseases would take their toll of children of both genders before they reached reproductive age, whereas raiding mostly raised the mortality of adult males and therefore did not necessarily have too great an impact on the total number of children born to each woman

50 Archaeological evidence supports the hypothesis that villages in the earliest stages of the transition to agriculture often consisted of members of a single lineage.[32] Later, multilineage villages came into ex-

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[25] A A Yengoyan, "Demographic and ecological influences on aboriginal Australian marriage selections", in R B Lee and I Devore, *op cit*, pp 185-199.

[26] S Polgar, "Population history and population policies from an anthropological perspective", *loc cit*, pp 204-205

[27] D R Bender, "Population and productivity in tropical forest bush fallow agriculture", in S Polgar, ed, *Culture and Population, op cit*, pp 32-45

[28] R W. Sussman, *loc. cit*

[29] M D Sahlins, "The segmentary lineage an organization of predatory expansion", *American Anthropologist*, April 1961, pp 322-345, A P Vayda, "Expansion and warfare among [illegible]

a cross-cultural study", *Current Anthropology*, April 1972, pp 238-249

[31] S Polgar, "Evolution and the ills of mankind", in S Tax, ed, *Horizons of Anthropology* (Chicago, Aldine Publishing Co, 1964), pp 200-211

[32] K-C Chang, "Study of neolithic social groupings", *American Anthropologist*, April 1958, pp 298 334

istence, and eventually the settlement pattern showed the emergence of social stratification. As stated above, lineages or lineage segments in agricultural villages usually control land in common. Animals, fruit-trees and agricultural implements, on the other hand, tend to be individually owned. The significant units in the reciprocal exchange networks often are villages or lineages, although individuals may be the actual trading partners. Important exchange relationships also obtain between cultivators and herders, despite the frequent hostility between the two groups.

51. The emergence of corporate groups holding rights to productive resources in common is likely to have occurred during the period of rapid population growth associated with the transition to food production. An "immortal" corporation based on descent lines makes much more sense when almost all lineages had a high probability of actually surviving through time; under conditions of population stability, the operation of random factors would cause a substantial proportion of "lineages" to die out. It is quite possible, therefore, that the original causative sequence between an increased number of children and unilineal forms of social organization was from the first to the second, rather than the reverse, as is commonly postulated by demographers.

52. In accord with the importance of descent lines, the socialization of children becomes the responsibility of adults who are kin rather than just whoever is in the vicinity. Furthermore, distinctions between different categories of relatives become important. Lineage exogamy, for one thing, will create a situation where one set of spouses (either all the husbands or all the wives) will have come from somewhere else to live in the village. Seen from the child's point of view, there will then be important differences in the people around him, according to which ones he will be likely to inherit from, with whom he will be most closely associated in work teams and whose relatives he will be allowed to marry. Thus, it is not surprising to find kinship terminologies and prescriptions for kinship behaviour which systematically distinguish relatives on the father's side from relatives on the mother's side and sometimes distinguish between relatives reckoned through each of the four grandparents. Children will be taught which categories of kin have to be treated in particularly respectful ways, which ones have a right to tell them what to do, which are expected to tease them and be teased in return, and which can be looked to for specific favours. Specialization of villages or lineages will also mean that different children might be learning different skills, such as those connected with pottery-making, weaving or collecting medicinal plants.

53. Finding potential spouses of the "correct" kinship relationship, as mentioned above, may present some difficulties, particularly as population growth slows down and random factors lead to increases in some lineages as compared with others, or to temporarily unbalanced gender ratios. Methods for "patching up" the system of kinship affiliation have come into use in these circumstances, including adoption, fictive kin and simply redefining relationships to suit the necessity of the occasion.[53]

Feudal states

54. Various circumstances may lead to the increase of power of one lineage over other lineages in an interdependent system.[54] Such circumstances include the monopolization of particularly important ritual functions, such as rain-making, the attachment of homeless client groups to a particular lineage and a strategic position in an exchange network. With social stratification, the dominant lineage may very well increase in numbers without splitting into new lineages. Larger population and the acquisition of greater resources and privileges cause an imbalance in the exchange system, which heretofore had been more or less symmetrical. Thus, the economic system gradually shifts from reciprocity to redistribution.[55] Goods and services are moved from the less powerful segments of the society to the more powerful, who, in turn, redistribute them in such a way as to consolidate and increase their dominance. While further specialization and technological development in stratified societies usually lead to increases in productivity, the transition from village agriculture to feudalism does not involve as great a change in the ecological system as the transition from gathering-hunting to food production. In short, what is different is the political economy, not the method of subsistence.

55. Centralization of this kind tends to be contagious, because the mobilization of resources and manpower possible for a stratified group will endanger neighbouring groups, unless they also can centralize in defense. Hostile relationships change from raiding to what may now properly be called warfare, and at this point, States can be formed by conquest. From social stratification, the sequence goes to chieftaincy, and from there to the complex political relationships of feudalism proper.

56. To a considerable extent, the authority of chiefs, kings or temples will conflict with the cohesion of lineages. One of the ways in which the central authority gains ascendancy in this contest is by interfering with some of the crucial functions of lineages, such as the regulation of sexual behaviour and marriage: incest becomes a crime against the deity or the laws of the State, for which punishment is now meted out by the king or his representative rather than the lineage elders; marriages must be sanctified or registered by higher

[53] L. A. Fallers, "The range of variation in actual family size", in A. J. Coale and others, *Aspects of the Analysis of Family Structure* (Princeton, Princeton University Press, 1965), pp. 70-82.

[54] L. Mair, *Primitive Government* (Harmondsworth, Pelican, 1964), pp. 107-122.

[55] K. Polanyi, *The Great Transformation: The Political and Economic Origins of Our Time* (Boston, Beacon Press, 1957), pp. 47-53.

authorities; adultery is an offence against "public" law and morality rather than an infringement of the rights of the spouse; and so forth [36] Other mechanisms for centralizing power include requiring entire age-grades to do military service under the king, contracting patron-client relations between the paramount and individuals rather than kinship groups, enlarging the royal court with slaves and retainers, and endowing the person of the king with ritual meaning Relationships between the king and his subjects, furthermore, may be phrased in parent-child terms, emphasizing both the benevolence of the paramount and the dependent status of the people

57. In many instances, the residence of the ruler attracts so many people that a town develops around it. Artisans, traders, beggars, soldiers and others no longer engaged in food production make their home in the vicinity of the palace.

58. In the economic system of feudal States, the agricultural population has to produce a surplus which is handed over to the higher authorities. The rulers, as previously mentioned, redistribute some of these goods to their retainers. Quite often, the land itself will be expropriated from the lineages; either the lord himself or some underlings such as headmen will then control land use. Rights in the means of producion will no longer be by virtue of membership in a lineage corporation, but through particular relationships with the ruler, such as kinship, clientage, shareholding or servitude

59. These economic relationships have a major impact on population dynamics As agricultural villagers are transformed into peasants, they must alter their subsistence activities so as to bring forth the surplus demanded of them One way to do this is to increase the domestic labour force without a corresponding increase in domestic consumption, specifically by having more children whose labour will be under the control of the household head and who will eat less than they produce. Economic forces, therefore, most probably underlie the various social and normative patterns so often associated with high natality among peasants (e g, early marriage, discouragement of divorce, quick remarriage of widows and widowers, heavy emphasis on the childbearing capacity of women and religious exhortation favouring high natality) The latter patterns are intermediary factors rather than an adequate explanation in and of themselves for population growth

60 The feudal situation conditioned a major change in mortality patterns as well. The concentration of large numbers of people into towns and cities gave rise to a new epidemiological situation, one in which infectious diseases could develop for which humans were the only reservoir [37] Typical of such infections are smallpox, typhoid fever and measles In addition, the urban setting was very suited for the multiplication of rats, which in turn became a reservoir for plague. Together with urbanism, the intensification of warfare and the reduced level of living of the agricultural population thus made the feudal period the worst in human history with respect to major epidemics [38]

61. Stratification in the larger society tended to be *reflected in greater inequality within the family as well* Under feudalism, women were usually relegated to a much more subservient position compared with their position in village agricultural societies [39] In peasant households, they were not only expected to produce many children and to take care of domestic chores, but to participate in many of the agricultural activities In most instances, however, they had very little economic independence and power Family structure, furthermore, diverged considerably between the upper and lower strata of society While the extended family may be aspired to by both segments of society, it was much more possible of realization for the *élite* [40] Although the situation varied according to patterns of land-holding and technology, the resources of the average peasant homestead were insufficient to support more than three or four working adults (and this would include youngsters from the age of about 12), as well as dependents Persons in excess of this number might have had to ask the lord for an unused portion of land, to become servants or to try to take up some occupation elsewhere Dividing up the land—a short-term solution with usually adverse long-term consequences—was possible only if the peasant were a freeholder, a condition which did not generally obtain until the next stage of evolution, that of the market economy

Colonialism, the market economy and industrialization

62 The subjugation of one State by another was, of course, an important feature of the feudal period Some empires, such as those of the Romans, the Incas, the Mongols and the Imams of Oman, stretched over great distances and even across some bodies of water But in the past 350 years, the use of guns and artillery ushered in a new kind of imperial relationship, namely, colonialism. Since these new empires were formed by the expansion of European countries (Japan joined them only at the very end of the nineteenth century) into the Americas, Africa and Asia, colonialism bears the imprint of European development.

63 It should be remembered that the primary impetus for these conquests was trade Christianity and political control followed soon after the explorers and merchants, but were secondary in importance. Contagious diseases of European origin, however, accompanied the very first adventurers and even spread ahead of the conquerors themselves The demographic impact of this factor was profound: the series of

[36] Y. A Cohen, *loc cit.*

[37] S Polgar, 'Evolution and the ills of mankind", *loc. cit*

[38] H Zinsser, *Rats, Lice and History* (Boston, Bantam, 1960)

[39] E Boulding "Women as role models in industrializing societies", in M B Sussman and B E Cogswell, eds., *Cross-National Family Research* (Leiden, Brill, 1972), pp 30-31

[40] G Sjoberg, *The Preindustrial City: Pas and Prese* (New York, Free Press, 1960), pp 157-163

epidemics that swept over the Americas decimated the original inhabitants to perhaps as few as one twentieth of their original number.[41] In Africa, where many European diseases had penetrated long before Vasco da Gama, it was mostly the slave trade and the advent of guns which led to a serious decline in population. In the Pacific, diseases of European origin resulted in consequences as drastic as or worse than those in the Americas. In Europe, meanwhile, population increased very substantially, owing, at least in part, to the spread of the potato—a plant imported from the New World.[42]

64. Another fundamental change in Europe was the growth of mercantilism. Local and regional trade were institutions compatible with and well-integrated into feudalism; long-distance trade, however, was severely hampered by the existence of many boundaries and hostile relationships between principalities. The economic mainstay of the feudal aristocracy was land. The long-distance merchants and their allies at various courts had an alternative source of income: luxury goods from the "East". Mercantilism was the first step towards the development of a full-fledged market system.[43] It fostered the accumulation of capital and its investment in goods other than that produced by the peasants and local artisans. The basic principle of exchange was altered from redistribution to the buying and selling of goods at a price. In this process, money itself became a "good" rather than just a convenient medium of exchange, but the full commercialization of the two other major components of the market economy, land and labour, did not occur until the nineteenth century.

65. The acquisition of land in the colonies was easily accomplished; in some cases, the original inhabitants were simply exterminated by disease and by attempts to enslave them, as in the Carribean; elsewhere, the conquerors simply replaced the original feudal rulers, as in Central America; the lands were declared unused when the original inhabitants withdrew after severe epidemics, as in the Highlands of Kenya; or the native rulers were transformed into plantation superintendents, as in parts of Indonesia.

66. Capital and labour were, at first, more difficult to obtain. Several of the large colonial trading companies periodically went bankrupt, and Governments eventually stepped in to assume full political and financial control of the operations. In Asia and Africa, the labour problem was attacked mostly by taxation and forced labour, and occasionally by the transportation of indentured labourers. In many parts of the Americas, slavery became the dominant pattern. For a considerable time, however, the mortality of people removed from their villages to work in plantations and mines required constant replacements. Gradually, subtler forms of economic bondage were substituted. Indigenous forms of family life and even of political relationships were allowed to continue during this second phase of colonialism, and the slave trade gradually came to an end. Colonies with substantial numbers of European inhabitants fought for—and eventually obtained—political independence, but remained closely tied to Europe economically.

67. During this phase, the population of the colonies began to increase at a rapid rate; in Java, for example, at an average of 2 per cent per annum during most of the nineteenth century.[44] Long before the introduction of mass immunization campaigns and environmental sanitation, the imposition of European rule, with the prohibition of internecine warfare, the improvement of transportation facilities and the unflagging demand for labour to produce goods for export were instrumental in bringing about this population spurt. From the peasants' point of view, the advantages of having a large domestic labour force, which had already existed under feudalism, were maintained and even strengthened under the colonial economic régime. Paying his hut tax, performing his labour duties in the fields of the *hacienda* owner or of the Government itself, or producing the share of the crop he owed to the overlord (whose status had been reinforced by the colonial administration) were made somewhat easier if he had plenty of hands available whom he did not have to pay.

68. In Europe at the time of Malthus, relations between landlords and peasants were changing rapidly. After the increase in population during the eighteenth century, aggravated by the enclosure movement and the importation of food crops from the colonies, rural unemployment and poverty worsened. The Poor Law Act of 1834, which reinstituted the punitive work-house system, turned out to be a crucial step in creating a reserve labour pool which was essential for the development of industrial capitalism. Those who remained on the land were also brought into the market system as land rents became fully commercialized.[45]

69. With industrialization and urbanization, the middle class emerged as a significant force in the metropolitan countries. Clerks, small *entrepreneurs* such as money-lenders, teachers and similar occupational groups also developed in the colonies, but their proportion in the total population remains small to this day. Nevertheless, the market system began to penetrate the economy in the colonies too. The upwardly mobile middle class in Europe, seeing the advantages of transmitting as much capital as possible to each of their dependants, began to reduce their family size towards the latter part of the nineteenth century.[46] For the poor

[41] H. F. Dobyns, "Estimating aboriginal American population", *Current Anthropology*, October 1966, pp. 395-416.

[42] W. Langer, "Europe's initial population explosion", *American Historical Review*, October 1963, pp. 1-17.

[43] K. Polanyi, *op. cit.*, pp. 59-85.

[44] C. Geertz, *Agricultural Involution: The Process of Ecological Change in Indonesia*, published for the Association of the Asian Studies by the University of California Press (Berkeley, University of California Press, 1963), p. 69.

[45] K. Polanyi, *op. cit.*, pp. 86-129.

[46] J. A. Banks, *Prosperity and Parenthood: A Study of Family Planning Among the Victorian Middle Classes*, International Library of Sociology and Social Reconstruction, (London, Routledge, 1954).

in Europe and the rural masses in the colonies, additional children continued to provide the possibility of additional income. Those who owned freehold land, however, often had to divide it among more numerous heirs

70 With the massive movements of Europeans to the cities and to the colonies, the elementary family unit of husband, wife and children came to be less closely tied to the network of kin and community in which it had been embedded under the feudal system Child labour, and later the school, brought young people from the masses into direct contact with the institutions of the larger society. As current or prospective participants in the wage economy, the State, in its turn, came to have an interest in their intellectual, attitudinal and physical development. New institutions of mutual assistance among neighbours and kin in urban areas also developed which transcended the co-residential unit. [47] Sexual behaviour, mate selection, child-bearing and child-rearing nevertheless became a much more individualized affair, somewhat removed from the sanctions exercised by relatives, but also increasingly regulated by the laws of the state.

71. The third stage of colonialism, beginning in 1945, was marked by the emancipation of many third-world countries from the administrative control of the metropolitan States As in the case of the countries which gained independence a century and a half earlier, administrative independence is not synonymous with economic independence. The requirements of the metropolitan States, however, have changed, and continuing population growth in the third world is no longer to their advantage. There is more than enough labour available to bring primary products to the point of export, and the increasing number of poor people is not providing the industrialized countries with a sufficiently growing market for their manufactured products. In those third-world countries, however, where significant steps have been taken towards equalizing the distribution of resources, the people themselves are once again realizing that having fewer children may be advantageous. Furthermore, patterns of greater independence from the supervision of kin are being popularized by the mass media. And, last but not least, the movement for women's equality is beginning to gain some ground.

Cultural development and family dynamics

72 The cultural developments of the past 350 years can be seen, on the one hand, as the culmination of nearly 10,000 years of increasing centralization of power, during which time the interests of families have been increasingly subordinated to the demands of state systems; and, on the other hand, as the beginning of a new era in which all families and individuals are beginning to obtain freedoms and comforts unprecedented in human history. The centralization of coercive power has allowed for mass genocide, absolute dictatorship and pervasive propaganda campaigns of deception, the emergence of participatory democracy, however, promises to bring a new dignity and meaningfulness to human life throughout the world Families are, at one and the same time, exposed to the vagaries of economic boom-and-bust cycles, the tyranny of police forces and the dulling idiocy of mass entertainment, as well as provided with some opportunities to develop their own styles of life, make use of highly effective health and family planning measures and spend large amounts of time together in enjoyable pursuits

Social welfare policies

73. In gathering-hunting societies, the welfare of each individual is the concern of the entire band In independent villages, each lineage looks out for its own membership Under feudalism, the main thing the lord was supposed to do for his subjects, in exchange for their servitude and a large part of their production, was to help protect them from other lords, bandits and spiritual dangers With the inception of the market economy, the State assumed control over most of these welfare functions, but, for the most part, it has exercised this power for the benefit of the *élite* There is often a time lag between the destruction of the community mechanisms to take care of orphans, invalids and old people, and the assumption by state bureaucracies of somewhat equivalent functions Poor-houses, prisons, mental institutions and the like serve not only as a means of keeping unwanted people out of sight, but as an object-lesson to the rest of the population that they should do their utmost to participate in the economy.

74. The high mortality and morbidity of children put to work during the early stages of industrialization certainly were factors in the passage of child labour laws; but the availability of other sources of cheap labour by the beginning of the twentieth century obviously made the passage of these laws easier. Improvements in the working conditions in factories and mines were obtained only after the bloody struggles of the trade-union movement, and conditions in agricultural labour in a number of countries still remain dismal. Support for ablebodied adults during periods of unemployment is a very recent development. In the face of continuing rapid urbanization, which aggravates the severe housing problem in most countries in the world, many countries are trying hard to speed construction, and in a few, such as China, policies discouraging migration to cities are also being attempted.

75. One programme of particular interest is the payment of family or child allowances. The main purpose of these allowances is to increase the health and welfare of mothers and children. But in a of

[47] M B Sussman and L. Burchinal, "Kin family network unheralded structure in current conceptualizations of family functioning", *Marriage and Family Living*, April 1962, pp 231-240, M Young and P Wilmott, *Family and Kinship in East London* (Harmondsworth, Penguin, 1962), G Lüschen, "Family interaction with kin and the function of ritual", *Journal of Comparative Family Studies*, Spring 1972, pp 84-98.

instances such programmes had the goal of stimulating the birth rate. Studies have shown that no such effects could be demonstrated for Western Europe and Canada.[48] However, a slightly different policy was followed in Hungary. This policy allows working mothers to extend their maternity leave until the child is 3 years old and to receive a child-care allowance amounting to about one half of the average pay of manual workers. Among certain groups of families, a slight, short-run increase in natality was observed.[49]

Health services

76. Healers are probably one of the earliest specialists in human societies. In most cultures outside the Western tradition, healers will usually be as concerned with re-establishing the balance between a person's relationships with the social and spiritual environment as with the functioning of his or her body. During feudalism, medical practitioners concerned themselves mainly with caring for the *élite*. Charity hospitals, often established by religious orders, were generally places to which people came to die. In the later stages of industrialization, as part of maintaining the stability and productivity of employees, medical-care programmes both in the metropolitan countries and in the third world were developed for wage earners and their families. Environmental sanitation and quarantine emerged as incipient public health programmes in the nineteenth century, and sometimes became one aspect of colonial rule. As the middle classes became more affluent, they stimulated the growth of private medicine in the West. In socialist countries, health care for the general population emerged as an important responsibility of the State.

77. Family planning as a separate preventive health service was offered before 1960 in only a small number of privately sponsored clinics. Opposition both from the medical profession, which saw only sterilization and abstinence as effective and harmless procedures, and from public officials afraid of negative reactions from Catholics, prevented the inclusion of this service in the charity medical care facilities of Western and colonial countries. Meanwhile, the middle classes in Europe and European populations overseas were able to obtain cervical caps and diaphragms from private medical doctors, and relatively safe abortions from clandestinely practising physicians. Gradually, beginning with India and Barbados, a number of countries began to provide family planning services to the masses. In many socialist countries, based on the importance given to women's rights and family welfare, abortion and contraception have been made available on relatively liberal terms.

78. The recent upsurge in concern with population growth has given a strong impetus to the further development of family planning programmes. Too often, however, these latter-day efforts are being promoted for purely Malthusian ends, ignoring the health and welfare of the family except as part of "motivational" propaganda.[50]

Women's liberation

79. The distribution of power between men and women is quite egalitarian among surviving gathering-hunting societies. In independent agricultural villages, the balance shifts somewhat to favour the men, but numerous instances of matripotestal and matrilineal societies have been described. With stratification and feudalism, as mentioned above, women are firmly relegated to a subservient role. Under slavery, and in some colonial situations, women's position did not sink as low as men's, since some of them continued to work as domestics well into old age, whereas the men were required to do heavy physical labour and became less "useful" as they became older.[51]

80. With industrialization, women were hired in factories; however, they were paid a lower wage even if they did the same kind of work as men. Western middle-class concepts about the wife as a social ornament also worked to the disadvantage of women in the economic and judicial realms. The export of such ideas reinforced patterns from the feudal period in non-Western societies, with the result that relatively few women in the more prosperous classes consider it proper to obtain gainful employment. Thus, in India, it is the women from the lowest status groups and from the top *élite* who are most likely to obtain gainful employment, with most of those in between remaining part of the household economy.

81. Strong movements for women's liberation are emerging among the wives of the *élite* in Africa, Asia, Latin America and the Middle East. In a number of instances, as in Tunisia, attempts have been made to mobilize a wider group of women to take part in the work of the national political party. Achieving equality for women is a high-priority objective in socialist countries. In Europe and the United States of America, a new movement for women's liberation, largely based among intellectuals, has emerged within the past five years. The goals of the movement range from economic equality to emancipation from psychological feelings of ineptitude and inferiority.[52]

New social institutions

82. Prospects that the State will "wither away" do not look too bright at the moment. If it does so in the future, however, there will still be social institutions

[48] A. Schorr, "Income maintenance and the birth rate", *Social Security Bulletin*, December 1965, pp. 2-10.

[49] E. Szabady, "Study of the impact of a family protection measure", *Journal of Comparative Family Studies*, Autumn 1971, pp. 156-164.

[50] S. Polgar, "Birth planning: between neglect and coercion", Proceedings of the Ninth International Congress of Anthropological and Ethnological Sciences, Chicago, September 1973 (in press).

[51] R. T. Smith, *The Negro Family in British Guiana* (New York, Grove Press, 1956).

[52] C. Safilios-Rothschild, ed., *Toward a Sociology of Women* (Lexington, Mass., Xerox Corporation, 1972).

through which people will relate to one another. The family, or something like it, may well be one of these institutions. There may also be, at least for a time, a world government to preside over the dissolution of States and to foster the ecological welfare of the planet

83. One institution related to the family, which may become very important in the future, is the commune Some communes in the past few centuries have been formed in the context of Christian religious movements, usually under the leadership of a single leader or "holy" person.[53] A more secular, but still slightly mystical, basis for the formation of such groups has recently been provided by the back-to-nature movement Most Israeli kibbutzim have also been formed on the basis of a religious or a socialist ideology. Communes in the Union of Soviet Socialist Republics and other centrally planned economies are primarily an economic institution; but in some cases, they have been involved in new departures for family life as well

84. The relationships between men and women and between adults and children are an important area in which communes tend to depart from the cultural pattern of the societies around them[54] Another feature, which in fact may be most characteristic of all communes, is the discouragement of private ownership Since these communes arose from feudal and industrial societies, in which women and children are often treated as the "property" of the household head, communal ownership of resources and non-exclusiveness of conjugal and parental bonds can be seen as related phenomena.

85. As mentioned above, in some recently formed communes a concern for man-environment relationships ("ecology") has been an important feature The sharing of productive resources, the low "through-put" of [illegible]

societies. If communes, then, are a prototype for the small-scale institutional organizations of the future, they might also signal a cyclical or spiralling movement in history *Recalling that the gathering-hunting stage of* human evolution took up most of the 2 million years since humans walked erect, a Utopian view of the future could also imply that these past 10,000 years, with the misery and oppression brought about by feudalism and market societies, represent an unfortunate detour in the course of human evolution—a detour that could have destroyed, and still might destroy, the human species and, possibly, even the entire biosphere of this planet—but, perhaps, only an aberration that neither was necessary nor is permanent

[53] C Nordhoff, *The Communistic Societies of the United States* (New York, Schocken, 1965, original publication, 1875)

[54] B Barger, B Hackett and R M Miller, "The communal family", *The Family Coordinator*, October 1972, pp 419-427

DEMOGRAPHIC FACTORS INFLUENCING THE FAMILY CYCLE*

*Mercedes B. Concepción and Felipe Landa-Jocano***

1. Traditionally, demographers study population problems in terms of such individual traits as sex, age, occupation, education, religion, and so on. These factors are believed to be highly significant in understanding human fertility behaviour. There has been very little, if any, study of individuals as socializers and as active participants in group life. Equally lacking in many demographic analyses is a serious consideration of the family or household as a social unit and determinant of behaviour. While individual traits are important, the family presents a greater challenge to demographers, particularly to those involved in population control programmes. It is through the family that society is formed, each generation is replaced by another, and decisions are reached concerning care, support and responsibilities to the group. Above all, the family is central to fertility, dependency, consumption costs, savings and social welfare.

2. This paper focuses attention on the formation, development and dissolution of the family as affected by changes in demographic factors and by such environmental constraints as place of residence (rural or urban) and prevailing socio-cultural conditions. Various studies in the Philippines and elsewhere in Asia are examined to discover modal forms of adaptation to changing demographic conditions. However, in so doing, one should bear in mind that Asia is tremendously broad and subcultural variations are complex so that any general statement requires repeated qualifications with regard to points of reference which may not apply to other groups. In fact, this limitation also applies, in some way, to the Philippines. Demographic data on the national level about family formation and dissolution are meagre, although case studies are available from different communities. The life cycle of the family is apparently one of the neglected studies in the country, if not in the Asian region. These case studies are used to illustrate certain processual principles associated with family formation rather than to make generalizations about its developmental cycle in the Philippine setting and elsewhere.

Basic characteristics of the family and household

3. In any society, the family is the basic building-block of social organization; it constitutes the fundamental unit out of which the entire society is organized. And within it the total world view of the people is developed. This has been so because the family, in many respects, is the first social unit to take hold of the individual before any other agencies in the community could contribute to the moulding of his personality. An understanding of how people think of the family in various cultural settings and of the role the family plays in people's lives is crucial to any attempt at innovation, especially at community levels of action. This requirement is particularly true of population programmes wherein the innovation being introduced involves the most intimate aspect of conjugal relationship—fertility behaviour.

4. The term "family" is commonly used to refer to the social unit of society, a unit normally composed of the father, the mother and their unmarried child or children who are either adopted or biological offspring of the spouses and who are either living with them or not. In its elementary or nuclear form, the family conceptually excludes all kindred outside the conjugal, parental and filial relationships, although in actual practice other kinsmen are sometimes considered part of the unit. In its extended form, the family encompasses a wider range of bilateral relatives who may either live with the family under one roof or occupy the "next door" in a family compound or apartment. This recognition of bilateral extension of kinship includes moral obligations to support these relatives in time of need or when they are too young to support themselves at the time of residence with the family.

5. Students of different Asian societies have characterized the family into a number of types. The more conservative observers simply make distinctions between the nuclear family and the extended family types, as described above. In addition, they differentiate "family of procreation" from family of orientation. The former is Ego's own family, established by his marriage, and the latter is the unit where Ego is born. Moreover, the family of procreation is composed of the spouses and their children; the family of orientation consists of Ego's parents and siblings.

6. Other researchers have sought to describe the family in terms of the structure of the unit. Several

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definitions of the nuclear family as used by different authors[1] contain a common element—the presence of father, mother and unmarried children In the situation described by Bessaignet, individual relatives in the household, other than the conjugal family, were regarded merely as an "adhesion", *ad hoc* arrangement, with the nuclear family retaining its character The implication here is that adhesions are simply additional persons exercising a minimum of influence on the structure of relationships within the nuclear family In the Philippines, this may be the case with domestic helpers, but not with kin relatives who normally expect to be within the immediate family circle

7. These observations lead to the conclusion that even in a relatively simple definition of the nuclear family, the cultural overtones have to be taken into consideration if one is to grasp the full significance of the empirical referents of a concept applied in different cultural settings

8 The elements that appear to be the characteristics of an "ideal type" extended family have been described as follows,

"a. Relatives other than husband, wife and unmarried children sharing residence with or living adjacent to the nuclear family

"b. Recognition of kin relations, either of a lineal or a collateral character

"c A pooling or sharing or joint ownership of resources which is usually formalized or legally recognized

"d. Recognized common responsibilities

"e. Common family or ancestor worship

"f. Reciprocal assistance patterns.

"g Joint activities either in production or consumption or both.

"h. Maintenance of expressive relations among extended family members, such as visiting, letter-writing, etc

"i. Use of the extended family as a reference group in decision-making.

"j. Authoritarian control over relationships and decision-making based on age, command over resources, etc."[2]

9. In general, the classical view among students of the family is that the level of industrialization and urbanization is inversely related to the incidence of the extended family[3] There is also a belief that extended families are much more prevalent in rural than in urban areas. It is maintained that the extended family tends to be replaced by the nuclear family as the society develops.

10. It had also been assumed that family size in rural, pre-industrial societies was substantially larger than that in developed countries, owing not only to higher fertility and larger numbers of living children, but to the doubling-up of nuclear families within the extended *ménage* The notion of the typical family in pre-industrial societies was one containing representatives of three or more generations, two or more nuclear families and several collateral relatives The traditional family in India was often cited as an illustration of this large and complex family system Dandekar and Unde have questioned this widely held view as not being supported by empirical data[4] Levy[5] argued that actual family structure has been rather similar in societies at all times and places, regardless of the structural ideals Table I presents the extent to which one type predominates over the other in selected Asian countries The differential incidence of nuclear and extended households in urban and rural areas in various Asian societies is shown in table 2

11. Definitions of the extended family indicate the direction of changes occurring in the transition from traditional to modern society Hagen viewed the extended family of traditional societies as made up of several generations in which all feel responsible for all and economic resources are pooled and made available to every member, subject to the judgment of the family patriarch[6] Husain distinguished different degrees of jointness in terms of residence, consumption, participation in production, in economic decision-making and sharing of the family income[7] Iijima defined the minimally extended family as consisting of the nuclear family and the parents of either husband or wife.[8] The

[1] Oscar Lewis, *Village Life in Northern India Studies in a Delhi Village* (Urbana, University of Illinois Press, 1958), Richard K Beardsley and others, *Village Japan* (Chicago, University of Chicago Press, 1959); Shigeru Iijima, "Ecology, economy, and social system in the Nepal Himalayas", *The Developing Economies*, vol 2, No 1 (1964), pp 91-105, Pierre Bessaignet, "Family and kinship in a Hindu village of East Pakistan an illustrative analysis", *Sociology and Social Research in Pakistan*, 1963, pp 2-6, Margaret Park Redfield, "The American family consensus and freedom", *American Journal of Sociology*, vol 52, No 3 (1946), p 175; George P Murdock, "The universality of the nuclear family", in N. W. Bell and E F Vogel, eds, *A Modern Introduction to the Family* (Glencoe, Illinois, The Free Press, 1968)

[2] Gelia T. Castillo and others, "The concepts of nuclear and extended family an exploration of empirical referents", *International Journal of Comparative Sociology*, vol 9, No 1 (1968), pp 1-40.

[3] Clifford Kirkpatrick, *The Family As Process and Institution* (New York, Ronald Press, 1963), William Kephart, *The* [illegible]

[illegible] Press, 1965)

[6] Everett E Hagen, *On the Theory of Social Change How Economic Growth Begins* (Homewood, Illinois, The Dorsey Press, Inc., 1962)

[7] A F. A Husain, "Pakistan", in R D Lambert and B F Hoselitz, eds., *The Role of Savings and Wealth In Southern Asia and the West* (Paris, UNESCO, 1963)

[8] *Shigeru Iijima, "Ecology, economy, and social system in the Nepal Himalayas", The Developing Economies*, vol 2, No 1 (1964), pp 91-105

TABLE 1. DISTRIBUTION OF HOUSEHOLD TYPES, SELECTED ASIAN COUNTRIES

Place	Number of households studied	Findings with respect to household composition (percentage)		
		Nuclear		Extended
India: Rampur village, Delhi state, northern India			*Jats and Brahmans*	
	150	32.2		66.7
		1.0	(single person)	
			Other castes	
		64.8		33.7
		1.7	(single person)	
India: Nakor, desert village near Jodhpur, western Pajasthan	Simple random sample of 405	41.0		49.0
Japan (1966 census)	23,085,393	68.1		31.9
Java: Modjokuto district	467 towns	57.8		32.4
		9.8	(one adult living alone)	
	153 villages	74.5		19.9
		4.6	(one adult living alone)	
Philippines (1968 national demographic survey)	Stratified multistage survey of 7,237	79.1		19.6
Republic of Korea (1966 census)	Sample of 4,900	66.8		33.2
Singapore (1966 sample household survey)			*Among households with one family nucleus*	
	13,273	80.0		20.0
Thailand (national longitudinal study of social, economic and demographic change, 1968-1972)	Multistage sample of 3,655	63.8	(Rural)	33.9
		63.6	(Provincial urban)	25.3
		56.1	(Bangkok-Thonburi)	28.3

SOURCES: For Rampur village, India, Oscar Lewis, *Village Life in Northern India: Studies in a Delhi Village* (Urbana, Illinois, University of Illinois Press, 1958); for Nakor village, India, A. B. Rose, "Society, economy, and change in a desert village", *Annals of Arid Zone,* vol. 1, No. 1 (December 1962), pp. 1-15; for Japan, Kazumasa Kobayashi, "Household data in the population census of Japan and some aspects of household changes", paper presented at the First Organization of Demographic Associates Workshop, Hong Kong, 23-27 February 1970, p. 19; for Java, H. Geertz, *The Javanese Family: A Study of Kinship and Socialization* (New York, The Free Press, 1961), pp. 3-5 and 31-33; for the Philippines, Alice Cabili-Lim, "A comparative study of nuclear and extended households in the Philippines", unpublished Master's thesis, University of the Philippines, 1973; for Republic of Korea, Hae Young Lee, "Households of Korea, 1960-1966", paper presented at the Second Organization of Demographic Associates Workshop, Hong Kong, 10-13 January 1972, p. 31; for Singapore, Stephen H. K. Yeh, "The size and structure of households in Singapore, 1957-1966", *Malayan Economic Review,* vol. XII, No. 2 (October 1967); for Thailand, Visid Prachuabmoh and others, *The Rural and Urban Populations of Thailand: Comparative Profiles,* Research report No. 8 (Bangkok, Institute of Population Studies, Chulalongkorn University, 1972), p. 15.

modified extended family as seen by Litwak [9] does not require the element of common residence but renders significant aid to relatives outside the nuclear family. Stuckert perceived the extended family as a reference group where the more classical features are no longer present but maintenance of emotional unity with extended family members is still of some concern. [10]

[9] Eugene Litwak, "Geographic mobility and extended family cohesion", *American Sociological Review,* vol. 25, No. 3 (1960), p. 385.

[10] Robert P. Stuckert, "Occupational mobility and family relationships", *Social Forces,* vol. 4, No. 3 (1963), pp. 301-307.

TABLE 2. URBAN-RURAL DISTRIBUTION OF HOUSEHOLD TYPES, SELECTED ASIAN COUNTRIES

(Percentage)

	Household type		
	Nuclear	*Extended*	*Unrelated persons*
Philippines (1968)			
Rural	83 9	16 1	—
Urban	71 5	28 5	—
Republic of Korea (1966)			
Rural	56 4	40 2	3 4
Urban	63 0	33 4	3 6
Thailand (1968-1972)			
Rural	63 8	33 9	1 4
Provincial urban	63 6	25 3	5 5
Bangkok-Thonburi	56 1	28 3	5 2

SOURCES For the Philippines, Alice Cabili-Lim, "A comparative study of nuclear and extended households in the Philippines", unpublished Master's thesis, University of the Philippines, 1973, p 67, for Republic of Korea, Hae Young Lee, "Households of Korea, 1960 1966", paper presented at the Second Organization of Demographic Associates Workshop, Hong Kong, 10-13 January 1972, p 31, for Thailand, Visid Prachuabmoh and others, *The Rural and Urban Populations of Thailand Comparative Profiles*, Research report No 8 (Bangkok, Institute of Population Studies, Chulalongkorn University, 1972), p 15

12. It is erroneous, however, to assume from the foregoing that the classical features can be found only in traditional society or that the modern elements exist only in highly developed societies There is a tendency for the traditional and modern features of the extended family to coexist in a particular society although some elements are more characteristic of developing and less of developed societies and are more prevalent in certain countries and less in others, even within the general category of developed or developing countries

13 What emerges from the above classification of types of families is the equation of the family with the household Of course, the distinction is not very clear-cut The household is composed of two or more families living in one house; the members share a common kitchen, contribute to the procurement of household necessities (except the staple grain) and prepare and eat their meals separately, and exchange cooked food. If the house happens to be a one-room dwelling, as in the village, members sleep in their chosen places If the house is an apartment in the urban areas, members sleep in their respective rooms. Like the nuclear family, the household is a consumption unit, with a common protective roof as the unifying factor.

14 Structurally, the household is distinguished from the nuclear or extended family by its size and in some cases its membership, which extends beyond the limit of kinship. The extended family has kinship as a point of reference; a household need not have this framework. A friend or any farm-hand of good standing with the family may be taken in as a member of the household until old age. Some distant relatives are sometimes taken in, especially unmarried siblings and cousins In any case, the household oftentimes acts as a single economic unit in which the elementary families work co-operatively with the head of the household, who is usually either the father, the mother or one of the grandparents

15. The composition of the household, as in the family, does not have any rigidly defined pattern. It changes as new generations of kin are born and as the circle of recognized relatives expands or contracts The following frame of reference may be taken into consideration with respect to the structuring of the household

(*a*) A newly married couple lives with either of the spouse's parents temporarily for about a year or so, until the birth of the first child;

(*b*) After the birth of the first child, the couple establish their own independent family, either in the vicinity or away from the family of orientation,

(*c*) Because both parents often work, either in the office or in the field, a close kin, usually the sibling of either spouse, or a domestic servant, stays with the children when they are away The kin or servant may stay in the household indefinitely, as long as they are on good terms with the family;

(*d*) The children who marry upon attaining the right age either leave or stay with their in-laws [11]

16 Like the family, the household has also been characterized into types Nena Eslao, [12] in her study of a district in Manila, presented the following characteristic features of the household

(a) *Nuclear family type* This group consists of a respondent (R) and her spouse, with or without children (real or adopted) Any children included must be unmarried,

(b) *Nuclear-lateral* The household has a nuclear core consisting of R's family, but which is extended by the presence of persons who are not lineally related to the respondent or her husband, and whose parents are not in the household Unmarried siblings, children of siblings, siblings of parents or their children constitute the most common type of lateral extensions,

(c) *Nuclear-joint* The only difference between this type and the preceding one is that at least one of the lateral extensions to the household is currently married or has had conjugal experience in the past;

(d) *Nuclear-linear.* The nuclear core is extended by the addition of one or more of the following relatives.

(i) Married children, their spouses or both, with or without children;

(ii) Grandchildren whose parents are not in the household,

[11] Felipe Landa-Jocano, *Growing Up in a Philippine Barrio* (New York, Holt, Rinehart and Winston, 1969)

[12] Nena B Eslao, "The developmental cycle of the Philippine households in an urban setting", *Philippine Sociological Review*, vol 14, No 4 (1966), pp 199 208

(iii) Parents of the respondent and/or of the respondent's husband;

(iv) Parents and siblings (with or without spouses and children) of the respondent and/or of the respondent's husband;

(e) *Less-than-nuclear.* In this type, the respondent does not have a co-resident spouse. The category includes those households in which the female head is widowed, separated or currently married but whose husband resides elsewhere because of illness or extended employment abroad or in the provinces;

(f) *Single (R).* This group includes all those households in which R has never been married.

17. The basis of these different classifications by Eslao is the age of the respondents at the time the family is established. It is clear that the household undergoes changes in composition over time, and it does so "in a perceptible direction". During the early stage of development, the domestic unit "tends to assume one of the three possible forms: Single-R, nuclear-lateral and nuclear joint". Sooner or later, "the female household-head marries or the extensions leave and the domestic unit, therefore, assumes an independent nuclear form". During this state, the household unit may recruit new members either by "birth and/or adoption causing the household to expand numerically while retaining a more or less permanent nuclear structure". The latter stage may be characterized by marriage of older children, in which case the nuclear core may acquire new extensions. Or it "may also lose some of its members. Old age and death eventually bring about the dissolution of the original domestic unit but the process of replacement ensures continued existence of the household beyond the life of any particular member".

Variations in the size and structure of families and households

18. Two developments in the field of demography have contributed to the study of families and households. First, the concept of the family life-cycle was developed to serve as a frame of reference and to provide a set of definitions for comparative studies of families and households on an international scale. In essence, the concept involves the idea that families undergo a series of stages during which changes take place in family size and composition with concomitant social and economic consequences calling for adjustment on the part of the family members. Secondly, the changes in size and structure of families and households parallel the process of demographic transition in the face of modernization, industrialization and urbanization.

19. In the course of the demographic transition, certain characteristic features of households may be distinguished for each of the two major stages:

(*a*) Relatively constant, high fertility coupled with moderate or rapidly declining mortality;

(*b*) Substantial declines in fertility accompanied by further, albeit slower, declines in mortality.

20. Most developing countries in Asia are likely to be found in stage (*a*). The prominent features with respect to changes in family and household size and structure, according to Davis, [13] include:

(*a*) Moderate increases in average size of households and families;

(*b*) Moderate increases in relatively large-sized (six or more persons) households and families and moderate decreases in relatively small-sized (three persons or less) households and families;

(*c*) Very small increases in the proportions of heads of households for the different sex and age groups;

(*d*) Small increases in the proportions of nuclear families and moderate increases in the proportions of one-person households.

21. More distinct and sweeping trends have characterized developed countries which have passed through stage (*b*), as follows:

(*a*) General secular decline in the average size of household and family;

(*b*) Increase in proportion of small-sized (three persons or less) households and families and decreases in large-sized (six or more persons) households and families;

(*c*) Over-all increases in proportions of household heads specific for age and sex, except among middle-aged families;

(*d*) Increases in the proportion of nuclear families and one-person households and decreases in the proportion of multigenerational extended families.

22. Limited trend data on household size and composition are available for selected Asian countries. To the extent possible, the figures are recorded in table 3 in an attempt to trace the multiphasic responses of families and households to changing demographic, economic and social factors. The data on household size in Japan show some irregularities and reverses in the course of the decline, although the trend over time is clear. The gross reproduction rate of Japan declined from 2.56 persons in 1920 to 2.13 persons. It is worth noting that while fertility declined considerably during this period, average household size was increasing. Although the effect of fertility decline on reducing household size was considerable, these results imply that other forces operating in an opposite direction were stronger. There appears to be a time-lag between the initiation of declines in fertility and reductions in size of household. The forces that cancelled out the effect of fertility decline in pre-war Japan were perhaps a more significant mortality decline and the tenacity of the extended family system in some sectors of the society.

[13] Kingsley Davis, *loc. cit.*

TABLE 3 TRENDS OF AVERAGE HOUSEHOLD SIZE, SELECTED ASIAN COUNTRIES

India		Japan	
Year	Average household size	Year	Average household size
1901	5.2	1920	4 99
1911	4 9	1925	4 98
1921	4 9	1930	5 08
1931	5 0	1935	5 13
1941	5.1	1940	5.10
1951	5 0	1950	5 02
1961	5.2	1955	4 97
		1960	4.52
		1965	4 08
		1970	3 72

Korea		Philippines	
Year	Average household size	Year	Average household size
1925	5 32	1903	4 7
1930	5.35	1918	5 1
1935	5 33	1939	5 1
1940	5 42	1948	5 5
1960a	5.55	1960	5 8
1966a	5 49	1968	6 4

SOURCE. In general, household and population data were [illegible]

23. For the past 60 years, India has shown a relatively stable average household size, although recent increases have been noted The data argue against the commonly held notion that the joint family prevailed in the past Dandekar and Unde [14] maintain that declines in mortality have led to increases in Indian household size. The same trend was observed for Korea

24. Rapid declines in mortality in the absence of substantial fertility declines, such as those occurring in most of the developing Asian societies, have been causing increases in family and household size in the Philippines. It may be expected that these increases will halt eventually, and family size will begin to decrease [illegible]

simply because of the rise in the average number of surviving children One would expect family size to decline again as the level of fertility falls in response to lower levels of mortality and changed living conditions". [15] The demographic transition is likely to have its parallel in family and household structure

25. Burch, [16] in investigating the influence of demographic variables on average household size under different family systems, found that under all family systems average household size was positively correlated with fertility, life expectancy and age at marriage. His stable population approach had been applied earlier by Coale [17] to stationary populations Households under nuclear systems never exceeded 10 persons, on average By contrast, under extended-family systems, with low mortality and high fertility, average household size reached levels seldom if ever observed in real-life situations, e g , 25 persons per household

26. Burch's hypothesis is unsupported in Asian countries, where positive relationships could only be found between average size of household and fertility For other measures listed in table 4, inverse relationships held for average size of household with age at marriage and with life expectancy

27 The importance of marriage and marital status as factors influencing the size and structure of house-

[14] Dandekar and Unde, *loc. cit*

[15] Thomas K Burch, "The size and structure of families a comparative analysis of census data", *American Sociological Review*, vol 32, No 3 (1967), pp 347-363

[16] Thomas K Burch, "Some demographic determinants of average household size an analytic approach", *Demography*, vol 7, No 1 (1970), pp 61-69

[17] A J Coale, "Estimates of average size of household", in A J Coale and others, *Aspects of the Analysis of Family Structure* (Princeton, New Jersey, Princeton University Press, 1965)

TABLE 4 SELECTED INDICATORS FOR SELECTED ASIAN COUNTRIES

Country or area and year	Median age at marriage		Expectation of life at birth		Proportion widowed at age 65		Average household size			Total fertility rate
	Male	Female	Male	Female	Male	Female	Total	Urban	Rural	
Sri Lanka (1963)	25 8	19 3	63 28	63 67	14 8	51 8	5 4	—	—	5 09
India (1961)	*18 9*	*17 2*	*41.89*	*40 55*	*25 9*	*71 9*	*5.2*	*5.2*	*5 2*	*6 01*
Pakistan (1961)	22 1	17 1	53 72	48 80	20.3	69 4	5 4	5.5	5 4	6.55
Philippines (1960)	24 2	21 3	48 81	53 36	24 0	53 9	6 7	5 9	7.1	6 27
Hong Kong (1966)	28 1	24 5	63 64	70 51	8 3	51 6	4 7	—	—	4.51
Japan (1965)	27 0	24 3	65 37	70 26	15 8	56 4	4 1	3 8	4 4	2.55
Republic of Korea	24 5	20 2	51.12	53 73	22 1	66 6	5 6	5 4	5 6	5 02
West Malaysia (1957)	27.8	23 2	68 2	68 5	15 6	56 4	4 8	—	—	5.50
Singapore (1957)	27 4	23 2	68 2		23 5	56 7	5 1	—	—	5.26
Thailand (1960)	24 0	21 0	53 6	58 7	17 6	59 4	5 6	—	—	5.78

SOURCES: For median age at marriage, D J. Bogue, *Principles of Demography*, (New York, John Wiley & Sons, 1969), table 11-3 All other data taken or computed from United Nations, *Demographic Yearbook*, various issues

holds and families has been widely documented by demographers and sociologists. Marriage constitutes the first step in the formation of the biological family, and the time most newly-wed couples establish their own households determines the extent of nuclear households.

28. In the post-war period, the trend observed in developing countries was towards later marriage. For example, the mean age at marriage in the Philippines rose from 20.9 years in 1903 to 22.3 in 1960.[18] By comparison, much larger changes occurred in India[19] and the Republic of Korea.[20] The process of modernization and industrialization in the developing countries can be expected eventually to bring about further substantial changes in marital status by age which will produce important effects on average family and household size.

29. Changes in the proportion of other marital-status groups besides the "married" also have an important bearing on the size and structure of families and households. In developing countries, where earlier marriage prevails, single persons at adult ages are relatively numerous. In addition, there is a much larger percentage of widowed persons, particularly among females in the older ages, owing to higher mortality (see table 4). Increases in the proportions of widowed and divorced female population generally produce a greater number of household heads that are female and contribute to a shrinkage in the average size of households.

30. Another factor that tends to influence household composition is the age of the household head. The number of Philippine households with non-nuclear members tended to increase with the age of the household head, as recorded in table 5. These Philippine findings are consistent with those of Yomina Talmon[21] in Israel, where children who have grown up are expected to live in the community founded by their parents in order to provide geographical proximity and daily face-to-face contact with aging parents. When the Filipino respondents were asked where they expect to obtain support in their old age if they have no savings, 16 per cent mentioned relatives as a possible source. In other words, old people in the Philippines, as elsewhere, turn to the extended family for companionship as well as for other needs in their old age. These findings likewise support the notion of a development cycle through which a simple family grows into an extended one and then breaks up into a simple family again. In India according to S. C. Dube:

"... a simple family emerging from this process may retain some adhesion or adhesions from the former extended family. Aged parents may later attach themselves to one of their sons who had broken away from the parental home earlier to set up an independent household. The changes from simple to extended and from extended to simple families are fairly frequent. Perfect three-generation extended families are rare, and not many simple families can remain technically simple for a long period."[22]

31. In a study of residence[23] in Canaman, Camarines Sur, Philippines, the following six decades in the developmental cycle of household arrangements are identified:

First decade (15-24), when most children are still members of the parental unit and household;

Second decade (25-34), when an increasing number of subordinate units are gaining independent status;

Third decade (35-44) and *Fourth decade* (45-54), when a drop occurs in the proportion of independent nuclear units being created; in the fourth decade, children have usually moved out of the parental household and the independent married-couple household emerges;

Fifth decade (55-64), when there is an increase of dependent units;

Sixth decade (65 and over), when the number of dependent units reaches a peak.

32. This characterization of the developmental cycle of the household is supported by Agaton Pal's data in the Visayan region, Philippines.[24] On the basis of age structure of husbands and wives relative to the dependency of the parents, he states that between the ages of 35 and 44 the dependency burden is highest. From 45 to 64, the dependency burden declines due to two factors: the wife stops giving birth; and some of the children are old enough to assist the parents. Lastly,

TABLE 5. PHILIPPINES: AGE DISTRIBUTION OF HOUSEHOLD HEADS, BY HOUSEHOLD STRUCTURE, 1968

Age of household head (years)	*Household structure* Nuclear	(percentages)	Extended
15-34	27.9		19.1
35-49	42.7		29.3
50-64	22.8		34.1
65+	6.6		17.5
TOTAL	100.0		100.0

SOURCE: Alice C. Lim, "Comparative study of nuclear and extended households in the Philippines", unpublished Master's thesis, University of the Philippines, 1973.

[18] Peter C. Smith, *Philippine Nuptiality in the Twentieth Century* (Population Institute, University of the Philippines, 1973).

[19] S. N. Agarwala, *Age at Marriage in India* (Bombay, Kitab Mahal Private Ltd., 1962).

[20] Hae Young Lee, "Households of Korea, 1960-1966", paper presented at the First Organization of Demographic Associates Workshop, Hong Kong, 1972.

[21] Yomina Talmon, "Aging in Israel, a planned society", *American Journal of Sociology*, vol. 67, No. 3 (1961), pp. 284-295.

[22] S. C. Dube, "Men's and women's roles in India: a sociological review", in Barbara E. Ward, ed., *Women in the New Asia* (Paris, UNESCO, 1963).

[23] Nena B. Eslao, "Residence in a Philippine town", unpublished Master's thesis, University of Hawaii, 1964.

[24] Agaton P. Pal, *The Resources, Levels of Living and Aspirations of Rural Households in Negros Oriental* (Community Development Research Center, University of the Philippines, 1963).

from 65, the dependency burden begins again. As the family dissolves, the household expands.

33. The markedly different patterns of family life cycles in the two countries, shown in table 6, show the influence of demographic and cultural conditions India shows an early marriage of women, an early bearing of the first child, a long childbearing period and a lengthy period during which the children remained in the parental household. Moreover, the data for India show that a mother is likely to live as a widow for more than 10 years before the marriage of her youngest child

TABLE 6 INDIA AND JAPAN MEDIAN AGE AT DIFFERENT STAGES OF THE FAMILY LIFE CYCLE

(Years)

	Banares, India, 1956		*Japan, 1960*
	Husband	*Wife*	*Wife*
First marriage	*17.3*	*14 6*	*24 4*
Birth of first child	20 9	18 2	26 3
Birth of last child	39 7	37 0	28 7
Marriage of first child	36 9	34 2	—
Marriage of last child	55 7	53 0	54 5
Death of one spouse	42 2	39 5	69 1
Age at own death	54 4	54 5	—

SOURCE For India, Andrew Collver, "The family cycle in India and the U S", *American Sociological Review*, vol 28, No 1 (1963), pp 86 96; for Japan, Kiyomi Morioka, "Life cycle patterns in Japan, China, and the United States", *Journal of Marriage and the Family*, vol 29 (August 1967), p 605

34. The family life cycle of Japan is characterized by late marriage and birth of first child, and by a surprisingly early termination of childbearing In fact, childbearing is concentrated in a very short period of 2 4 years, since the first child is born on average when the mother is 26.3 years of age and the last is born at age 28 7. In contrast, the Banares, India, data show the average childbearing period extending over 18.8 years Also, owing to the substantial increase in longevity among men as well as women in Japan, a parental couple can expect to live together for almost 15 years after the last child has married and set up his own household

35 The apparently traditional descriptions of the family and household presented above must not mislead one to think that there are no variations in both the structure and the function of the family and household. Indeed, variations are numerous The types of families and households found in the rural areas and the roles they play in community life are certainly different from those found in the urban areas, especially in suburban residential locations But when the basic characteristics —the unquestioned, implicit postulates—are examined, far greater similarities than differences stand out. In both urban and rural areas, the family functions as the main point of reference in the various networks of social relations, a reservoir of values and norms that legitimize much of interpersonal and group behaviour in the community

36 Seen in the prevailing emphasis on emotional [illegible] some kind of "resistance"—explicitly stated or implicitly [illegible] behaviour.

FAMILY SIZE AS AN ECOLOGICAL RESPONSE

37 Reliance on the family for the resolution of major economic and social problems is, perhaps, the main reason why most Asians have large families, in spite of verbalized preference for small ones. Available literature has indicated the range to be from five to seven children, with variations from eight to ten

38 In some countries, particularly in the urban middle-class communities, the sizes range from three to five. On the whole, large family sizes are maintained in the face of great efforts to reduce them Available data suggest that family and household sizes can be seen as ecological responses to place of residence

39. For example, in nine studies dealing with the Asian family, seven of them showed the prevalence of nuclear families (see table 1) Although there was some indication that extended households occurred in the urban areas, the extensions do not always rest on kinship ties This is understandable because working parents generally hire domestic help to attend to household chores while they are at work

40. In one report,[25] two explanations are given as apparent reasons for the trend towards extended households in the urban areas:

(1) The possibility of urban families being economically better off than rural relatives and the tendency for kinsmen to gravitate towards the more affluent members;

(2) The possible flow of rural family members to the urban areas to study or work, in which case they seek their kinsmen and join their household.

41. Internal migration has a very important impact on household size, particularly in rapidly urbanizing countries, such as Japan. The significance of this factor lies in the fact that massive internal migration can lead to the formation of nuclear households or undoubling of families, even in a country where the nuclearization process is otherwise rather limited owing to deep-rooted extended-family traditions

42. Migration of single persons to urban areas often works in two ways towards a decline in average house-

[25] John J Carroll and others, "Provincial paper on changing patterns of social structure in the Philippines, 1896-1963", United Nations Educational, Scientific and Cultural Organization, Research Centre, 1963

hold size, first, by reducing the size of the parents' households; and, secondly, by increasing the proportion of small-size households in the area of in-migration.

43. Migration is nearly everywhere highly selective, and migrants consist predominantly of young adults. A great number of young migrants to urban places live in boarding-houses or one-room apartments, thus forming either one-person households or else becoming part of group quarters or institutional households. The formation of many new small-size households in urban areas, concomitant with internal migration, clearly contributes to lower average household size both in cities of in-migration and in countries or villages of out-migration. In Japan, it was found that about 27 per cent of the decline in average household size between 1955 and 1965 was due to the formation of new one-person households, as a result of internal migration. On the other hand, a dramatic decline in single-person households in Singapore (from 20.7 per cent in 1957 to 8.2 per cent in 1966) contributed to the rising average household size.

44. In the course of the family cycle, improved economic and social opportunities in urban areas may induce the husband or couple to migrate, thus bringing about changes in average family size and composition, and possibly even in the eventual number of children born to the couple. At the other end of the family life cycle, it is frequently common, particularly in developing countries, for elderly couples to return to their villages of origin to spend the last years of their lives, after residing in the town or city during their reproductive years and bringing up their children there.

45. Nevertheless, smaller families are unmistakably more prevalent in the urban-industrial and high-income countries than in the rural-agricultural and lower income countries. This situation is due in part to the fact that the urban-industrial countries are characterized by low fertility, whereas the rural-agricultural countries have unequivocally high fertility. Moreover, in urban-industrial countries, there is generally a greater tendency for grown children to leave their parental households early and for older persons to retain their own households than is the case in rural-agricultural countries.

46. Various economic changes associated with the process of industrialization may exert an influence on household size. While the participation of women in economic activities may have an influence on household size, the nature of this relationship is not entirely clear. On the one hand, high activity rates for women, through their effect in lowering fertility, may tend to reduce average household size. On the other hand, it has been argued that high female-activity rates can lead to a slowdown in the process of household fission and to a renewal of the functions of the doubled-up family. Empirical data on this question are presented below.

47. Seen in this perspective, it is clear that attempts at deliberately restructuring the size of the family are fraught with difficulties because the rationale for maintaining large families is more attuned to the adaptive needs of the members in the context of the socio-economic *milieu* of the community. By "adaptive" is meant the capacity of an individual or unit to maintain life in a particular habitat. In the rural areas, the economic potentials of children and the assurance of early relief from the burden of work on the part of parents function as ecological pressures to which farmers respond accordingly. The same requirements are imposed by the urban environments on urban dwellers. The potential assistance of the successful kinsmen in the urban areas serve as a stimulus for urban migration and eventual extension of households. The high cost of housing in urban areas also functions as an environmental constraint for people to live together under one roof. There is no such pressure in rural areas.

48. Thus, the argument that the target population must limit the number of children because the people are hit hard by economic problems does not appeal to many in the so-called "disadvantaged areas" because it neglects the fundamental requirements of adaptation.

49. Perhaps a few illustrative cases from the rural and urban areas in the Philippines will further help to clarify the above-mentioned points on adaptation. In the western Visayas and in the Laguna Lake area, available data indicate that the average sizes of families in communities studied ranged from five to seven children. Interviews with parents concerned revealed that they recognized the difficulties accruing from having more children than they could economically support. At the same time, however, they enumerated the advantages of large families which, when compared with perceived difficulties, outweigh the difficulties in terms of fulfilling much of the adaptive requirements for economic survival and psychological needs. In effect, the contribution children will make to the family larder in future is part of the traditional, unverbalized family planning strategies of many target populations, and this factor reinforces the need for larger families.

50. The same is true with respect to slum-dwellers. In fact, one more factor may be added—the high rate of illegitimacy. This phenomenon may be attributed to the impersonality of urban environment, where strict moral values, in terms of stigma the community attaches to deviants, are dysfunctional; to the greater emphasis on the *machismo* complex among males; and also to the need for economic and psychological support among females. All of these factors add up to impose certain pressures on the people to behave the way they do, which contributes to the increase of childbirth.

51. The *machismo* complex, for example, imposes on an individual the need to engage in a sexual role which could only be verified by the peer group to which he belongs in terms of the number of affairs he maintains and the number of children he sires either with his legitimate wife or with his mistresses. In fact, it is not surprising to find a labourer or omnibus driver, barely earning $50 a month, having two or three mistresses. For a woman, having children also means

an additional source of income. It is a dominant belief among informants that a man may not support his mistress, but he can be coerced into supporting his children Moreover, most female informants are unanimous in their belief that "being a mistress is a temporary affair wherein youth is dissipated in the process Without a child or children, one is in a pitiable situation in old age" In effect, this view supports the adaptive requirements of slum life.

52. Preference for large families is not only the core value of the above-mentioned disadvantaged groups. Civil organizations and educated leaders in many countries in the region almost "hero-worship" large families by giving annual awards to "Family of the Year", "Parents of the Year", "Outstanding Parents" and so forth. Although the awards are generally focused on achievements of members of the families selected, the sacrifices parents experienced in the process of bringing up a large family are publicly recognized and extolled as virtues to be emulated. Faced with this public adulation of large families, it is doubtful whether small ones have any virtue at all. As the "rewarding ritual" becomes an annual affair, it likewise becomes part of the aspirations of most people: a perceptual model towards which efforts have to be geared if only to gain public recognition Implicitly, acceptance is a powerful stimulus for achievement-motivation, and, if the society places a high premium on big families, then the acceptance-goal of people will certainly be directed to this end.

FAMILY SIZE AS A CULTURAL RESPONSE

53. The persistence of large families in both rural and urban communities studied in the Philippines led to an inquiry on the meaning of family size to the people. It is, perhaps, in the perceptual domain of target populations that one could find clues for a satisfactory explanation of this phenomenon. In the search for models, however, some difficulties were encountered. No consensus could be obtained among informants with respect to the most preferred norm for family sizes. What they verbalized constrasted with what they had in terms of family size. Even those who had aspired to smaller families during the early stage of their marriage in 1964 were today burdened with large, growing ones In other words, certain factors must have come into play, other than biological determinants, which earlier aspirations indicated

54. In the Laguna Lake area in southern Luzon, levels of aspiration were inconsistent with actual numbers of children borne. The area has been one of the most worked-over areas in terms of family-planning education programmes In addition to using broadcast and print media, the promoters of the programmes have conducted personalized campaigns for the reduction of family size. This goal seems far from having been achieved

55. In order to specify what cultural factors might be related to family size, an attempt was made to probe into the cognitive domain of the local culture. It is interesting to note that in both rural and urban sectors of the country, the people do not have a specific term for "smallness" when referring to family units. Among the Tagalogs, terms like *kaunti* (few), *ilan* (several), *maliit* (small) and similar diminutive terms and phrases are used to place emphasis on "smallness" However, the usage is more analogous than specific *Maliit na pamilya* (small family) is applicable but does not necessarily describe the actual size of the unit because the term *maliit* emphasizes smallness with reference to individuals or physical entities, as in *batang maliit* (small child) In fact, when the phrase *maliit na pamilya* was repeated to a number of informants, corrections were offered because it was said that the phrase did not quite sound right

56 On the other hand, the term for "large size" is precise—*laki* This is generic Even in asking questions, the correct phrase is, "*Gaano kalaki ang inyong pamilya?*" ("How large is your family?") Smiles and expressions of "ahs" were registered on the faces of those present in the interviews when an informant stated that they "have a limited number of children" Many informants who only have one or two children are often teased, in the judgement of others, they are either sterile, weak or simply stingy, and "what a pity for the child—no playmates".

57 In other words, the concept of smallness as part of the family attribute is not present in the folk culture of the communities studied In contrast, largeness in family size is the ideal type, and hence it is sustained by the perceptual categories present in the cognitive domain of the people To stress over and over the need for a small-size family or to emphasize it as desirable is to expect certain misconceptions concerning the innovators' motives since there is no point of reference in the culture to support the new idea

IMPLICATIONS FOR POPULATION EDUCATION STRATEGY

58 Proponents of small-size families always point to the achievement of western societies as desirable models. There is no quarrel about this The main question is how western societies achieved the shift and whether it is possible to replicate their experiences in non-western societies, such as those found in Asia The answer is "yes", provided the ecological conditions which brought about the shift in western societies are also replicated Again, one has to look at the adaptive requirements of environment which will sustain the change once it is introduced

59. It is, perhaps, safe to say that one of the preconditions for the reduction of family size to a desired number is ecological change. Industrialization is one such change which is necessary for sustained familial change. For a model, one has to examine the conditions

in industrial communities, or even in the suburbs, of Asian cities.

60. In a suburb of metropolitan Manila, for example, data indicated that as income increased, due largely to the construction of seven factories in the community, housing and job shortages decreased. To the working families concerned, household help became a necessity, just as staple food was.

61. Working couples had to make certain decisions concerning the number of children. Either the wife quit her job or a domestic helper was hired. In the latter case, it meant additional family expenses in terms of the helper's salary; if the choice was the former, it also meant reduction of income. Most couples resorted to spacing of children. And while it is true that urban families tend to be larger than rural ones, the extension is often defined in the context of business transactions. That is, the kinsmen who join the nuclear family, except siblings, often pay board and lodging; sometimes, the payment is in the form of rice, vegetables and other staples.

62. In other words, it is generally the ecological pressure which generates change and gives it direction. As was noted, the place of residence influences the formation, growth and dissolution of families. As one moves from the rural to urban areas, the change in the size of families—from nuclear to extended—is very remarkable. In the rural areas, nuclear families are easily established if only for the reason that one can build his own house, however light the materials used. The space is open. No one pays rent and, in some cases, one does not even have to ask permission. In contrast, extended families are dominant in the urban areas, particularly in the slums, because of the high rent, shortage of housing and temporary nature of residence in one place.

63. Thus, even if the programme on population education is understood but local resources cannot sustain it, its implementation is likely to encounter some difficulties, if not outright rejection. This is perhaps one of the reasons why family planning programmes, despite the energy expended on them in terms of education and training of promoters of change, only achieve a very minimal effect. On the basis of available data, it can be predicted that without the corresponding ecological support in terms of community resources, the problem of population increase in the Philippines, as well as in other Asian countries, is likely to persist for a long time.

64. Family planning innovation is similar to other kinds of change. It has to be maintained at the community level of action. In the field of economic change, for example, innovators have been sponsoring the idea that education is the answer to the problem. However, many have not quite realized that decision-making in this connexion is a painful process. The parents have to decide between making the child contribute to the economic larder early or to delay his earnings by furthering his education. Often the former triumphs. The child, as soon as he is able, takes a job and contributes to the economic life of the entire family.

65. From the discussion presented above, it is clear that to anticipate or even suggest criteria for a desirable norm for family size in the region is difficult. It is even more difficult to describe it. Research data from the different Philippine communities, as well as those gathered in various Asian countries, indicate that family formation is a response to ecological pressures and to prevailing socio-cultural conditions. It is in this area that information is lacking. More research is needed on non-demographic factors which impinge upon the formation, development and dissolution of families. To state any categorical number as the desirable size for a family without seriously considering the ecological conditions which define it is to be unrealistic; it shows unfamiliarity with realities of community life. Unlike any other form of innovation, family planning cannot be shown by a positive demonstration that small families are better than large ones. For one thing, it is difficult to show empirically that better health, better levels of living, better education, better employment and so on are the resultant effects of small families.

66. Moreover, norms are difficult to specify. Even informants themselves find it hard to make familial norms explicit. There are several reasons for this problem. On the whole, the difficulty rests on the context and situation. People are reluctant to generalize when asked direct questions about norms, although they make many implicit generalizations when talking spontaneously. What emerged from research undertaken in this area was that one person's norm is not necessarily another's. Certainly, the manner in which large families succeed in business cannot be used to suggest large families for lower class, low-income families, and vice versa.

67. To say, therefore, that small-size families are desirable is to say nothing about the circumstances which may make this possible. Even the term "average" as generally applied to the family is a misnomer. It can be used to describe almost anything. Statistically, it simply defines a consistent clustering of numbers at a given point in time. However, it does not mean that culturally this enumerated response pattern is the preferred value, so that once the average index is obtained, strategies for maintaining the desired norm can be developed. As William Goode said, "Conception is an intimately personal matter, not a mass phenomenon."

68. In others words, in order to achieve a more meaningful approach to population problems, other methodologies in addition to purely demographic ones have to be used. The study of the family life cycle and familial responses to different ecological settings may furnish more insights than is usually conceived.

THE EFFECT OF MODERNIZATION ON FAMILY REPRODUCTIVE BEHAVIOUR *

Richard A. Easterlin **

1 This paper analyses the nature and causes of the change in family reproductive behaviour associated with modernization The first section takes up the meaning of modernization and describes the changes in family reproductive behaviour associated with it The second presents a theoretical framework for analyzing the determinants of reproductive behaviour In the third and fourth sections, this framework is used to trace the causal links between modernization and reproductive behaviour

Nature of changes in family reproductive behaviour during modernization

2 Modernization is the transformation in economic, social and political organization and in human personality observed in a growing number of countries since the mid-eighteenth century.[1] On the economic side, this transformation involves a sustained rise in real output *per capita* It encompasses wide-ranging changes in techniques of producing, transporting and distributing goods, in the scale and organization of productive activities, and in types of outputs and inputs It embraces major shifts in the industrial, occupational and spatial distribution of productive resources and in the degree of exchange and monetization of the economy. On the social and demographic side, it involves significant alterations in fertility, mortality and migration, in place of residence, in family size and structure, in the educational system and in provision for public health. Its influence extends into the area of income distribution, class structure, government organization and political structure In terms of human personality, modernization involves an increased openness to new experience, increased independence from parental authority, belief in the efficacy of science and ambition for oneself and one's children [2]

3 The changes in family reproductive behaviour associated with the process of modernization encompass actual fertility, techniques of fertility control and desired fertility The present discussion is confined to married women, since the concern is with reproductive behaviour of the family The presentation is partially speculative, since the evidence available on some of these aspects of reproductive behaviour is thin, but it appears desirable to try to draw as comprehensive a picture as possible, so as to identify needs for knowledge, as well as clearly established facts

Fertility decline

4 The change on which the greatest agreement exists is the shift in fertility from high to low levels which, together with a similar (and usually prior) movement in mortality, is termed "the demographic transition" Viewed against the long backdrop of prior human experience, the magnitude of this fertility change is remarkable indeed, as is made vividly clear in the words of one commentator on the English fertility decline

> "The typical working class mother of the 1890's, married in her teens or early twenties and experiencing ten pregnancies, spent about fifteen years in a state of pregnancy and in nursing a child for the first years of its life She was tied, for this period of time, to the wheel of childbearing Today, for the typical mother, the time so spent would be about four years A reduction of such magnitude in only two generations in the time devoted to childbearing represents nothing less than a revolutionary enlargement of freedom for women " [3]

Conscious regulation of fertility

5. Some writers, most notably what might be termed "the French School", emphasize an additional feature of modernization of family reproductive behaviour, namely, the mode of fertility regulation [4] These scholars

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[1] J S Coleman, "Modernization II—Political aspects", R A Easterlin, "Economic growth an overview", D Lerner, "Modernization I—Social aspects", all in David L Sills, ed, *International Encyclopedia of the Social Sciences* (New York, Macmillan, 1968), vol X, pp 395-502, vol IV, pp 395-408, and vol X, pp 386-395, respectively See also S Kuznets, *Modern Economic Growth Rate Structure and Spread* (New Haven, Connecticut, Yale University Press, 1966)

[2] A Inkeles, "Making men modern on the causes and consequences of individual change in six developing countries", *American Journal of Sociology*, vol LXXV, No 2 (September 1969), pp 208-225.

[3] R. M Titmuss, *Essays on the Welfare State* (London, Unwin University Press, 1966), p 91

[4] J Bourgeois Pichat, "Social and biological determinants of human fertility in nonindustrial societies", *Proceedings of the American Philosophical Society*, vol CXI, No 3 (June 1967), pp 160-163, L. Henry, "French statistical research in natural fertility", in M C Sheps and J C. Ridley, eds.,

(Continued on next page)

see a shift from a situation in which fertility is controlled through various social and biological mechanisms to one of deliberate limitation of family size by individual households. The view is clearly expressed by Bourgeois-Pichat:

"Fertility in preindustrialized societies seems to be strongly determined if not controlled in the sense we give to this word today. It is determined by a network of sociological and biological factors and when the network is known, the result can be predicted. Freedom of choice by couples is almost absent. The couples have the number of children that biology and society decide to give them.

"One of the main features of the so-called demographic revolution has been precisely to change not only the level of fertility but also change its nature. Having a child has been becoming more and more the result of free decision of the couple. And this change in the nature of fertility may be more important than the change in its magnitude. Fertility has left the biological and social field to become part of the behavioural science . . .

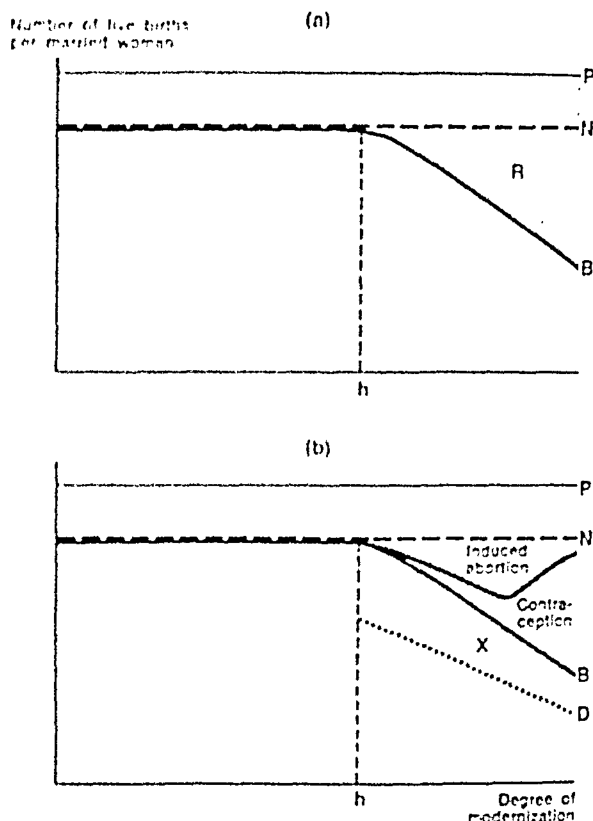
"For fertility we had for a long while a lot of customs carefully molded in the course of time which almost completely determined the size of families. These customs are still there but they are for the most part useless, as fertility is now under the will of people."[5]

6. In a similar vein, a recent paper by K. Srinivasan speaks of a "transition" in fertility regulation accompanying the demographic transition: "Every population undergoing a demographic transition also experiences a transition in the nature by which it regulates fertility . . . The stages of transition of fertility regulation methods can conveniently be classified into phases: Biological, Natural, Premodern, and Modern."[6]

7. It should be recognized that such statements are primarily hypotheses rather than assertions of fact. The extent to which there exists conscious regulation of fertility by individual households in pre-modern societies is a matter on which much more research is needed.

8. As the Bourgeois-Pichat quotation indicates, to some observers the change in the mode of fertility regulation is even more significant than the decline in fertility itself, because of the fundamentally new attitudes it entails. It is noteworthy that Inkeles identifies as first among "personal qualities which . . . may validly

Figure I. Stages in reproductive behaviour during modernization



be described as fitting a reasonable theoretical conception of modern man [that of] openness to new experience, both with people and with new ways of doing things *such as attempting to control births*".[7]

9. There are, then, two generalizations concerning the modernization of reproductive behaviour, one stressing the shift to low fertility and another emphasizing, in addition, a new mode of fertility regulation, adoption of deliberate control by individual households. Figure I (*a*) brings out the relationship between the two. In the figure, the degree of modernization is measured along the horizontal axis.[8] Following Sauvy,[9] the following definitions are made:

(*a*) Reproductive potential, *P*, is the number of children that 1,000 married women "in the most favour-

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Public Health and Population Change (Pittsburgh, Pennsylvania, University of Pittsburgh Press, 1965), pp. 333-350; L. Henry, "La fécondité naturelle, observation-théorie-résultats", *Population*, vol. 20, No. 5 (September-December 1961), pp. 625-636; L. Henry, "Some data on natural fertility", *Eugenics Quarterly*, vol. 8, No. 2 (June 1961), pp. 81-91; A. Sauvy, *General Theory of Population* (New York, Basic Books, Inc., 1961).

[5] J. Bourgeois-Pichat, *loc. cit.*, p. 163.

[6] K. Srinivasan, "Need for studies on transition of fertility regulation", as reported in Southeast Asia Development Advisory Group of the Asia Society, *SEADAG Reports: Population Panel Seminar* (Elkridge, Maryland, 6-8 April 1972), p. 8.

[7] A. Inkeles, *loc. cit.*, p. 210 (emphasis added).

[8] An illustrative measure is the "development index" devised in *Contents and Measurement of Socio-Economic Development: An Empirical Enquiry*, United Nations Research Institute for Social Development report No. 70.10. (A time series application is to be found in A. S. Banks, "Industrialization and development: a longitudinal analysis", *Economic Development and Cultural Change*, vol. XXII, No. 2 (January 1974), pp. 320-337.

[9] A. Sauvy, *op. cit.*, p. 348.

able conditions" would have during their reproductive career;

(*b*) Natural fertility, *N*, is the number of children per 1,000 married women during their reproductive career *if no conscious effort were made to regulate* fertility

In any society at a given time, even though no conscious effort is made by individual families to limit fertility, actual fertility will fall short of reproductive potential because of physiological conditions limiting fertility, such as malnutrition, or cultural circumstances, such as an intercourse taboo, which have the unintended effect of lowering fertility. Natural fertility, *N*, is therefore represented in figure I (*a*) as lying below reproductive potential, *P*, the difference being due to conditions which from the point of view of the family unintentionally depress fertility For simplicity, *P* and *N* are assumed in this section to remain constant throughout the course of modernization.

10 The conditions envisioned in the Bourgeois-Pichat quotation imply that actual fertility, *B*, would be the same as natural fertility, *N*, in a pre-modern situation, as there is no deliberate control of fertility by the individual family At some point in the course of modernization, depicted here as *h*, actual fertility begins to trend downward as individual households begin to consciously control fertility. To the right of point *h*, the vertical distance, *R*, between *B* and *N*, represents conscious fertility control, measured in terms of births averted The diagram thus depicts a shift from pre-modern conditions, in which observed fertility corresponds to natural fertility, to modern conditions, where the spread of conscious fertility regulation is associated with a down-trend in observed fertility.

11 The purpose of the diagram is to give a schematic representation of the general trends in fertility and fertility control envisioned in the studies previously cited A more realistic picture would take account of the marked fluctuations characterizing fertility both in pre-modern and modern times, and especially in the former One might allow, too, for the possibility of some conscious fertility regulation, even in pre-modern conditions, among, say, the upper social strata, by allowing *B* to parallel *N*, but at a lower level. The modernization of reproductive behaviour would then take the form of the diffusion of conscious control throughout the remainder of society.

Desired fertility

12 In going beyond the fertility decline to the shift to conscious fertility regulation, one has already ventured into somewhat speculative ground Two additional hypotheses of even a more speculative nature may be noted One relates to the trend, not in observed fertility, but in desired fertility Unfortunately, there appears to be little or no evidence on the secular trend in desired fertility during the history of the developed countries, and one must rely on comparing countries at different levels of modernization at the current time.

13. According to Ronald Freedman, people in pre-modern societies today typically have a fairly clear idea of how many children they would like to have:

"In various underdeveloped societies, a large number of sample interview surveys have been made since the Second World War in which peasant populations have been asked such questions as how many children they want for themselves, how many are right for others, etc In almost all of these studies only a small minority of the respondents found the questions ridiculous or meaningless or answered that such matters were up to fate or God, etc Even where the answers invoke the Diety or fate, further inquiry frequently indicates that the respondent has rather firm ideas of what he desires that fate or divine providence should bring "[10]

14 Tabbarah's survey[11] of the available evidence indicates that desired family size in the currently less developed areas ranges from a little over three up to eight, whereas in developed countries the range appears typically to be between two and three If cross-section evidence on the association between desired fertility and modernization may be used to infer historical trends, then this implies that desired size decreases in the course of modernization

15 Typically, desired fertility in developed countries lies below actual fertility, that is, there is "excess fertility" In figure I (*b*), a curve representing desired fertility, *D*, has been added to the situation depicted in figure I (*a*) This curve lies below the curve for actual fertility, *B*, and trends downward At any given time, the excess of actual over desired fertility is excess fertility, *X* Because of lack of evidence, the curve for desired fertility is omitted from the pre-modern phase of the diagram.

Types of conscious fertility control

16 The other speculation relates to whether there are systematic trends during modernization in the specific forms taken by conscious fertility regulation In terms of the diagrammatic analysis, the question at issue relates to the importance of various components of *R*, births averted This can be illustrated by reference to Requena's analysis of experience in Chile[12] Still another view is presented in Srinivasan's analysis[13] In Requena's model, a society passes through three stages, from no birth prevention, to primary reliance on abortion, to major reliance on contraception, with some residual abortions to meet contraceptive failure The

[10] R Freedman, "Norms for family size in underdeveloped countries", *Proceedings of the Royal Society, B*, vol CLIX (1963), p 222

[11] R B Tabbarah, "Toward a theory of demographic development", *Economic Development and Cultural Change*, vol XIX, No 2 (January 1971), pp 261-263

[12] M B Requena, "Chilean program of abortion control and fertility planning present situation and forecast for the next decade", in S J Behrman, L Corsa and R [illegible] eds., *Fertility and Family Planning A* [illegible] Arbor, University of Michigan Press, 1[illegible]

[13] K Srinavasan, *loc. cit*

hypothesized sequence of change in conscious fertility control is illustrated in figure I (*b*). To the right of point *h*, as conscious control (*R*) emerges and grows, it takes first the form of induced abortion. Eventually, however, contraception takes over and induced abortion recedes in quantitative importance.[14]

Summary

17. The picture that emerges of the changes in family reproductive behaviour during modernization is as follows: a decline in observed and desired fertility and a growth in deliberate fertility control by the individual household. In this paper, these will be taken as the "facts" of change in reproductive behaviour. An adequate explanation of the modernization of reproductive behaviour should account for all of these changes, not just for fertility decline. The growth in conscious fertility regulation may itself be marked by a characteristic trend in methods used, from, say, induced abortion to contraception, or more generally, from traditional to modern methods, but no analysis of this topic is attempted here.

18. The need is obvious for more empirical research to test out the patterns sketched in figure I, and, to the extent they prove valid, to fill in specific numerical co-ordinates. At the current time, even the facts of the decline in fertility itself are not adequately established,[15] let alone those in the other variables, though some recent research on natural and desired fertility is available. Naturally, the current experience of less developed countries and primitive societies provides an invaluable laboratory for this work.[16]

Analytical framework

19. This section develops briefly a formal framework for fertility analysis, which parallels in general form the conceptual scheme of figure I and which thus lends itself to interpretation of the changes presented there. The framework is a modification of the usual economic framework for fertility analysis to take fuller account of the theoretical and empirical work of demographers and sociologists. The principal dependent variable is the total number of surviving children of a "representative" married couple, since surviving descendants, rather than births as such, are what parents are basically concerned about. Both spouses are assumed to live throughout the reproductive span of the wife. Questions relating to the formation of reproductive unions and to child-spacing are left aside.[17]

20. The determinants of fertility are seen as working through one or more of the following:

(*a*) The demand for children, the number of surviving children parents would want if fertility regulation were costless;

(*b*) The potential output of children, the number of surviving children parents would have if they did not deliberately limit fertility;

(*c*) The costs of fertility regulation, including both subjective (psychic) costs and objective costs, the time and money required to learn about and use specific techniques.

Demand for children

21. The immediate determinants of the demand for children are income, prices and tastes.[18] The demand for children is seen as depending upon the household's balancing of its subjective tastes for goods and children against externally determined constraints of price and income in a way that maximizes its satisfaction. Variations in the basic taste, price and income determinants will cause differences in demand among households at a given time, or for a given household over time. Other things being constant, the number of children desired

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[14] The present diagram is a variant of that presented in the useful Population Council summary of findings from family planning research, J. A. Ross and others, "Findings from family planning research", *Reports on Population/Family Planning*, No. 12 (October 1972), p. 36. Other reports providing valuable data on fertility and fertility control in the third world are B. Berelson, "KAP studies on fertility", in B. Berelson, ed., *Family Planning and Population Programs: A Review of World Developments* (Chicago, University of Chicago Press, 1966), pp. 655-668; R. J. Lapham and W. P. Mauldin, "National family planning programs: review and evaluation", *Studies in Family Planning*, vol. 3, No. 3 (March 1972), pp. 29-52; W. P. Mauldin, "Fertility studies: knowledge, attitude and practice", *Studies in Family Planning*, No. 7 (June 1965), pp. 1-12; D. Nortman, "Population and family planning programs: a fact-book", *Reports on Population/Family Planning*, No. 2 (June 1971), pp. 1-48.

[15] A. J. Coale, "Factors associated with the development of low fertility: an historic summary", *World Population Conference, 1965;* vol. II, *Fertility, Family Planning, Mortality* (United Nations publication, Sales No. 66.XIII.6), pp. 205-209; A. J. Coale, "The decline of fertility in Europe from the French Revolution to World War II", in S. J. Behrman, L. Corsa and R. Freedman, eds., *Fertility and Family Planning: A World View* (Ann Arbor, Mich., University of Michigan Press, 1969), pp. 3-24; M. Livi-Bacci, *A Century of Portuguese Fertility* (Princeton, New Jersey, Princeton University Press, 1971); E. van de Walle and J. Knodel, "Demographic transition and fertility decline", *Contributed Papers, Sydney Conference, Australia, 21-25 August 1967* (Liège, International Union for the Scientific Study of Population, n.d.), pp. 47-57.

[16] Recent years have witnessed increasing attention by anthropologists to the formal demography of primitive societies, e.g., M. Nag, *Factors Affecting Human Fertility in Nonindustrial Societies: A Cross-cultural Study* (New Haven, Connecticut, Yale University Press, 1962). In terms of the present framework, these societies lie to the left of point *h* in figure *I*(*b*). An important contribution of anthropological research would be to establish the relative values of *P*, *N*, *B* and *D*, as well as the specific mechanisms by which *N* is kept below *P* and, if applicable, *B* below *N*.

[17] The present exposition is highly condensed. For fuller treatment, see R. A. Easterlin, "The economics and sociology of fertility: a synthesis", prepared for the Seminar on Early Industrialization, Shifts in Fertility, and Changes in Family Structure, held at the Institute for Advanced Study, Princeton, New Jersey, 18 June – 9 July 1972; R. A. Easterlin, "Towards a socioeconomic theory of fertility: a survey of recent research on economic factors in American fertility", in S. J. Behrman, L. Corsa and R. Freedman, eds., *Fertility and Family Planning: A World View*, pp. 127-256.

[18] G. S. Becker, "An economic analysis of fertility", Universities-National Bureau Committee for Economic Research, *Demographic and Economic Change in Developed Countries* (Princeton, New Jersey, Princeton University Press, 1960), pp. 209-231; R. A. Easterlin, "Towards a socioeconomic theory of fertility . . ."; H. Leibenstein, *Economic Backwardness and Economic Growth; Studies in the Theory of Economic Development* (New York, John Wiley and Sons, Inc., 1967).

would be expected to vary directly with household income (assuming children are a "normal" good), directly with the price of goods in relation to children, and inversely with the strength of tastes for goods in relation to children It is through tastes or subjective preferences that attitudinal considerations stressed by sociologists operate, such as norms concerning family size and the "quality" of children, i e, standards of child-care and rearing

22. As stated above, the principal dependent variable here is surviving children, since what parents are ultimately interested in is grown offspring, not number of births Birth behaviour may be linked to the demand for children through the rate of infant and child survival. For households to achieve a given number of surviving children, the necessary number of births would be higher, the lower the level of infant and child survival Even though tastes, prices and income remained unchanged, birth behaviour might vary because of changes in the survival prospects of children Other things being equal, the higher the survival prospects, the lower the birth rate.

23 So far it has implicitly been assumed that the family size decision refers to children of a standard "quality", that is, children embodying a given set of inputs of time and goods. Allowance can be made for variations in child quality by viewing child quality as an additional good along with number of children and goods consumed by the parents [19] An increase in income would then be expected to raise both the number of children and the standard of child quality, while a rise in the relative prices of inputs required for children would lead to substitution against both child numbers and child quality. Furthermore, subjective preferences relating to child quality might change, leading, for example, to greater emphasis by parents on the quality of children at the expense of number of children.

Potential output of children

24 On the production side of fertility determination, the key analytical concept is the potential output of children, the number of surviving children a household would have if fertility were not deliberately limited This depends, in turn, upon natural fertility and the probability of a baby surviving to adulthood Given natural fertility, an increase in infant survival prospects would increase the potential output of descendant children Similarly, given survival prospects, the potential output of children would vary directly with natural fertility

25. The motivating force behind natural fertility is not the demand for children, but sexual desire, which influences fertility through frequency of intercourse Coital frequency is also affected by involuntary abstinence due to such factors as impotence or illness. Moreover, in addition to frequency of intercourse, natural fertility depends upon fecundity or infecundity, as affected by involuntary causes, and upon foetal mortality from involuntary causes. (Sociologists will notice that the terminology here is that of the well-known Davis and Blake article [20])

26 Natural fertility depends in part upon physiological or biological factors and in part upon cultural practices Included under the biological head would be factors that influence natural fertility through such mechanisms as genetic influences on fecundity or the effect of disease and malnutrition on coital frequency and the ability to carry a foetus to full term Under the cultural head would be various social customs or events that inadvertently affect coital frequency, fecundity, or foetal mortality, such as the belief that sexual intercourse should be avoided while a mother is nursing (an "intercourse taboo") or physical separation of partners due to such things as civil strife or seasonal migration for employment purposes Two societies identical in biological and physiological characteristics might differ in natural fertility because, for example, an intercourse taboo led to a higher prevalence of involuntary abstinence in one society than in the other As has been mentioned, natural fertility in a given society is likely to be below the reproductive potential of the population because of both biological constraints and cultural conditions that inadvertently reduce family size

Motivation for fertility regulation

27 The potential output of and demand for children jointly determine the motivation for fertility regulation If the potential output falls short of demand, there is no desire to limit fertility, on the contrary, an "excess demand" situation of this type would result in a demand for ways to enhance fertility and for the adoption of children, although these possibilities are usually quantitatively unimportant Households might have knowledge of the means of regulating fertility, but there would be no incentive to use them In this situation, parents would be expected to have as many children as possible; that is, the number of children parents actually have would correspond to their potential output. Variations in the number of children parents have would arise from variations in the determinants of potential output, namely, natural fertility and the probability of an infant surviving to adulthood

28. On the other hand, if the potential output exceeds demand, an "excess supply" situation, parents would be faced with the prospect of having unwanted children and would be motivated to regulate their fertility In an excess supply situation, therefore, there is a demand for ways of limiting fertility Whether fertility control will actually be used, however, depends upon how the costs of fertility regulation compare with the motivation to limit fertility.

[19] M L Wachter, "Government policy towards the fertility of the poor", *Fels Discussion Paper No 19* (Philadelphia, The University of Pennsylvania Philadelphia, The Fels Center of Government, 1972)

[20] K Davis and J Blake, "Social structure and fertility" *Economic Development and Cultural Change,* No (April 1956), pp 211-235

The costs of fertility regulation

29. While motivation is a necessary condition for fertility regulation, it is not a sufficient condition. Fertility regulation imposes costs on the household of two types. There are psychic costs—the displeasure associated with the idea or practice of fertility control—and market costs—the time and money necessary to learn about and use specific techniques. These costs, in turn, depend upon the state of attitudes in society towards the general notion of fertility control and towards specific techniques, and the degree of access to fertility control, in terms of both the availability of information and the range of specific techniques and their prices. Typically, a family-planning programme lowers market costs by increasing information and providing services free or below cost, and also lowers subjective costs by lending legitimacy to the notion of practising birth control.

30. Whether in a given excess supply situation fertility control will actually be used depends upon how the costs of fertility regulation compare with the motivation to limit fertility. Given the strength of the motivation, the lower the costs of fertility regulation, that is, the more nearly conditions approach those of the "perfect contraceptive society", where psychic and market costs would be zero,[21] the greater would be the adoption of fertility regulation and the more nearly would the number of children parents have correspond to the number they desire. Conversely, the higher the costs of fertility control, the more nearly would actual conditions approach the potential output of children, the lower would be the deliberate control of fertility, and the greater would be the number of unwanted children.

Summary

31. In the present analysis, the determinants of fertility are seen as working through one or more of the following: the demand for children if fertility regulation were costless, the potential output of children if no conscious effort were made to control fertility and the costs of fertility regulation. The immediate determinants of the demand for children are income, the price of children in relation to goods and subjective preferences for children compared with goods. The potential output of children depends upon natural fertility and the survival prospects of a baby to adulthood. The costs of fertility regulation include subjective costs ("attitudes") as well as the time and money necessary to learn about and use specific techniques ("access").

32. The role of these factors in determining actual fertility differs depending upon the comparative state of the potential output of and the demand for children. If the situation is one of excess demand, or even if it is one of excess supply, but the motivation for fertility control falls short of the costs, then the number of children parents have corresponds to their potential output, and the determinants of potential output govern variations in actual output. If, however, the situation is an excess supply one in which the motivation to regulate fertility exceeds the costs, then deliberate limitation of fertility occurs and the number of children parents have falls below potential output. Yet, as long as fertility regulation is not entirely costless, some parents still have unwanted children. The situation is thus one in which the actual number of children parents have falls short of potential output, the difference reflecting the extent of conscious fertility control, but the actual number exceeds the desired number, the excess consisting of the number of unwanted children.

Links between modernization and the determinants of reproductive behaviour

33. Among the complex of changes embraced by modernization, several seem especially important in bringing about the shift to modern conditions of childbearing. Historically, these have been:

(*a*) Innovations in public health and medical care;

(*b*) Innovations in formal schooling and mass media;

(*c*) Urbanization;

(*d*) The introduction of new goods;

(*e*) *Per capita* income growth.

More recently, in a few countries another aspect of modernization—family planning programmes—has perhaps also played a noticeable role in influencing reproductive behaviour.

34. The table given below presents a summary view, based on the framework just sketched, of the channels through which reproductive behaviour is influenced by these various aspects of modernization. The aspects of modernization are listed on the left-hand side, and the principal factors immediately relevant to fertility determination, at the top, as column headings. An entry in a cell indicates that the specified item on the left influences the fertility determinants at the top in the direction shown. For example, the negative sign in column 1 of row 4a indicates that, other things being equal, the introduction of new consumer goods during modernization tends to reduce the strength of preferences for children in relation to goods, and, thus, the desired number of children. In drawing up the table, an attempt has been made to identify, on the basis of the literature, what appear to be the most important links between modernization and reproductive behaviour, rather than all hypothetically possible connexions. Thus, the absence of an entry in a cell does not necessarily mean that no relation whatever exists, but that typically it is probably not very important. The reasoning underlying the specific cell entries follows.

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[21] L. Bumpass and C. F. Westoff, "The perfect contraceptive population", *Science*, vol. CLXIX, No. 3951 (18 September 1970), pp. 1177-1182.

DIRECTION OF EFFECT OF VARIOUS ASPECTS OF MODERNIZATION ON INDICATED DETERMINANTS OF NUMBER OF SURVIVING CHILDREN PER MARRIED WOMAN

Aspect of modernization	*Factors through which family size is influenced*						
	Demand for children			*Potential output*		*Costs of fertility regulation*	
	Tastes (1)	*Income (2)*	*Prices (3)*	*Natural fertility (4)*	*Survival prospects (5)*	*Subjective (6)*	*Market (7)*
1. Better public health and medical care[a]				+	+		
2. Growth in formal education and mass media[a]	−		−	+	+	−	−
3. *Urbanization*[a]	−		−		−	−	−
4. New goods							
a. Consumer goods	−						
b. Fertility control						−	−
5. *Per capita* income growth	−	+		+	+		

[a] To the extent this item also increases *per capita* income, additional effects as shown in line 5 would occur

Public health and medical care

35. Improved public health and medical care in the course of modernization impinges on the reproductive situation of the family by tending to increase the potential output of children in two ways. First, it is likely to increase the natural fertility of women, because, for example, healthier women are more likely to carry a foetus to full term [22] Secondly, even if natural fertility were unchanged, infants are more likely to survive to adulthood, and the potential output of children would be correspondingly increased These relationships are indicated in the table by the positive signs in columns 4 and 5 of row 1.

36 Furthermore, better public health and medical care may raise *per capita* income, because a healthier, more energetic population is likely to be more productive.[23] Increased *per capita* income, in turn, influences a number of fertility determinants over and beyond the effects of better health just mentioned. However, to simplify the table, only the effects directly attributable to public health and medical care improvements are shown, not those that might indirectly be induced through the effect of better health on *per capita* income As indicated in the foot-note to the table, a full accounting for the effects of improved public health and medical care would also take account of the indirect consequences as a result of *per capita* income growth, shown in line 5 The same treatment has been followed in the table with regard to the next two aspects of modernization, improved education and urbanization, each of which may raise *per capita* income as well as influencing reproductive behaviour directly The effects shown in the row for each of these factors exclude any indirect consequences they may have as a result of increased *per capita* income. Correspondingly, in principle, the full range of effects of each of these factors comprises not only that shown on its respective line, but that shown in line 5 for *per capita* income growth

Education and mass media

37. Turning to the growth of formal education and the associated expansion in mass media, even disregarding any effects resulting from *per capita* income [illegible] most pervasive [illegible] As shown in [illegible] the principal fertility determinants—demand, potential output and the costs of fertility regulation. The impact on potential output may be touched on first, since the reasoning is much like that in regard to the effect of public health and medical care improvements Formal education and expanded mass media improve health conditions by diffusing improved knowledge with regard to personal hygiene, food care, environmental dangers and so on They may also break down traditional beliefs and customs and thus undermine cultural practices, such as an intercourse taboo, which have had the latent function of limiting reproduction In these ways they tend to enhance the potential output of children by raising natural fertility and/or increasing the survival prospects of babies; hence, the positive signs in columns 4 and 5 of row 2.

38 Education and the mass media tend, too, to lower the costs of fertility regulation, as shown by the negative signs in columns 6 and 7. They may [illegible] information not formerly available on vari

[22] J Bourgeois Pichat, "Relation between foetal infant mortality and fertility", *World Population Conference, 1965*, vol II, *Fertility, Family Planning, Mortality* (United Nations publication, Sales No 66 XIII 6), pp 68 72

[23] W Malenbaum, "Health and productivity in poor areas", in H E Klarman, ed, *Empirical Studies in Health Economics* (Baltimore, Maryland, Johns Hopkins Press, 1970), pp. 31-54.

of fertility control, reducing the expense in time and money previously required. They may also alter cultural norms adverse to the use of fertility control, and thus lower the subjective costs of fertility regulation, by challenging traditional beliefs and encouraging a problem-solving approach to life.

39. Lastly, formal education and the expansion of the mass media tend to reduce the demand for children by shifting tastes in a manner unfavourable to children and decreasing the price of goods in relation to children (row 2, columns 1 and 3). With regard to the relative price of children, if better education improves the income-earning possibilities of women, then the alternative cost of the mother's time required in child-rearing is increased. While some offset to this may be available, for example, through the help of domestics or other family members, there is probably some net positive effect on the cost of children and thus a tendency towards a reduction in desired family size. In addition, compulsory education may increase the relative cost of children by reducing the possible contribution of child labour to family income.

40. Tastes for children, more specifically the intensity of the desire for children in relation to goods, are affected negatively by education because children, and the life-style associated with them, are essentially an "old" good, while education and the mass media present images of new life-styles competitive with children. Deborah S. Freedman has found that the more people have been exposed to modern influences, as indicated by their education and exposure to mass media, the more likely they are to want modern goods and services.[24] Another possibility, receiving much emphasis today, is a "liberated" life-style for women, involving greater market work and less family activity. Furthermore, education and the mass media may lead to higher standards with regard to child-care and rearing, creating greater emphasis on the "quality" of children at the expense of numbers. (Note that this is a taste, not a "cost" effect, since it works through a change in subjective attitudes and not a market phenomenon.) In these ways, education and the mass media increase the subjective attractiveness of expenditures competitive with having more children, and thus tend to lower desired family size.

41. These developments are part of a more general shift in attitudes that takes place during modernization. This shift is brought about not only by education and the mass media, but by the population's increasing urbanization and participation in other modern institutions like the factory and agricultural co-operative. A valuable summary description of this development is provided by Inkeles:

"We believe our evidence . . . shows unmistakably that there is a set of personal qualities which reliably cohere as a syndrome and which identify a type of man who may validly be described as fitting a reasonable theoretical conception of modern man. Central to this syndrome are: (1) openness to new experience, both with people and with new ways of doing things such as attempting to control births; (2) the assertion of increasing independence from the authority of traditional figures like parents and priests and a shift of allegiance to leaders of government, public affairs, trade unions, cooperatives, and the like; (3) belief in the efficacy of science and medicine, and a general abandonment of passivity and fatalism in the face of life's difficulties; and (4) ambition for oneself and one's children to achieve high occupational and educational goals. Men who manifest these characteristics (5) like people to be on time and show an interest in carefully planning their affairs in advance. It is also part of this syndrome to (6) show strong interest and take an active part in civic and community affairs and local politics; and (7) to strive energetically to keep up with the news, and within this effort to prefer news of national and international import to items dealing with sports, religion, or purely local affairs."[25]

42. Among others, Ronald Freedman has emphasized the fertility implications of these attitudinal changes, citing involvement with "the ideas and institutions of a larger modern culture" as a basic factor in the transition to lower fertility.[26]

Urbanization

43. The process of economic modernization requires a redistribution of population from rural to urban areas, and this is largely accomplished by a vast increase in rural-urban migration. Sociologists have traditionally stressed the implications for reproductive behaviour of this aspect of the modernization process, and in a recent paper, Kuznets too has assigned an important role to this factor.[27] Urbanization, like education, reduces the demand for children by reducing tastes and lowering the price of goods in relation to children (row 3, columns 1 and 3). (The possible effects resulting from *per capita* income change continue to be set aside.) The effect deriving from tastes has been touched on immediately above. With regard to costs, the available evidence indicates that the relative price of children of

[24] D. S. Freedman, "The role of modern durables in economic development", *Economic Development and Cultural Change*, vol. XIX, No. 1 (October 1970), pp. 25-48.

[25] A. Inkeles, *loc. cit.*, p. 210.

[26] R. Freedman, *loc. cit.*, pp. 220-245; R. Freedman, "The sociology of human fertility", *Current Sociology*, vol. X/XI, No. 2 (1961-1962), pp. 35-68; R. Freedman, "The transition from high to low fertility: challenge to demographers", *Population Index*, vol. XXXI, No. 4 (October 1965), pp. 417-429; N. B. Ryder, "The character of modern fertility", *The Annals of the American Academy of Political and Social Science*, vol. CCCLXIX (January 1967), pp. 26-36.

[27] Simon Kuznets, "Population trends and modern economic growth—notes towards a historical perspective", *Population Debate*, vol. I, part four; D. Kirk, *Europe's Population in the Interwar Years* (League of Nations publication, Sales No. II Economic and Financial 1946.II.A.8); F. Lorimer, *Culture and Human Fertility* (Paris, United Nations Educational, Scientific and Cultural Organization, 1954).

a given "quality" is usually higher in urban areas than in rural[28] A variety of factors are responsible for this The price of food is higher in urban areas than in rural Also, farm children take less time away from a mother's paid work and contribute more time towards family work than do urban children In both cases, this would raise the relative cost of children in urban areas compared with rural Thus, the effect of urbanization of the population is increasingly to place the population in an environment where goods become relatively less expensive than children, and, other things being equal, correspondingly more attractive.

44 In regard to the potential output of children, urbanization is probably a negative influence, tending in itself to lower the survival prospects of children (row 3, column 5) The reasoning here is that concentration in densely populated areas increases exposure to disease and tends, other things being unchanged, to raise mortality The result would be a lower number of surviving children from a given number of births This effect may be less applicable, however, under the more modern public health and medical conditions in urban areas in many of today's less developed nations than it was in the historical experience of the developed countries.

45. Lastly, urbanization tends to reduce both the subjective and market costs of fertility regulation, in ways much like those of formal education and expanded mass media (row 3, columns 6 and 7) In higher density urban situations, access to fertility control knowledge is likely to be greater and market costs consequently reduced Subjective costs, too, are likely to be less, because of the role of the urban environment in breaking down traditional attitudes, among them the reluctance to try new ways of doing things

New goods

46 Another facet of economic modernization is the continuing introduction of new goods[29] The association between increased consumption of modern goods and reduced fertility has been noted in recent studies In terms of the present framework, the introduction of new goods tends to lower the demand for children by shifting tastes in an adverse manner, as shown by the negative sign in row 4a, column 1 The enjoyment of new goods tends to require life-styles other than those centred on children, since new goods are typically substitutes for, rather than complementary with, children Thus, holding other factors constant, the relative strength of household desires for goods unrelated to children is increased and desired family size decreased At any given level of income, households would tend to shift expenditure towards new purposes and away from old goods, including in the latter, having and raising children.

47 Among the new goods associated with modernization are some specifically related to fertility control Historical examples are the modern condom and improved methods of induced abortion; more recently, the oral contraceptive pill and the intra-uterine device (IUD) Such developments typically reduce market costs of fertility regulation by providing cheaper methods They may also lower the subjective costs of fertility regulation by providing less objectionable options to the household For example, an advantage claimed for both the pill and IUD compared with most other methods is that they separate the contraceptive act from that of intercourse Allowance for the effects of new methods of fertility control is made in the table by the negative signs in columns 6 and 7 of row 4b

Per capita *income growth*

48 Lastly, attention is focused on the effects of *per capita* income growth, whether due to the aspects of modernization in lines 1-3 of the table, or to other factors, such as the adoption of modern techniques of *production In the economic analyses of fertility*, the effect of *per capita* income change typically stressed is a positive effect On the assumption that children are normal goods, one expects, other things being equal, that higher income would encourage households to want more children, just as higher income encourages greater consumption of goods in general This influence is shown by the positive sign entered in row 5, column 2

49 However, there is another and counteracting effect of *per capita* income growth on the demand for children, operating by means of tastes, as shown by the negative sign in row 5, column 1[30] Because of the substantial upward trend in living levels during economic development, each generation typically comes from a more prosperous background than the preceding generation Because of this, the views of each successive generation as to the material requisites of the "good life" tend to be progressively higher Goods which to one generation may have been luxuries become necessities to the next—the motor-car is a case in point This "intergeneration taste effect", as it might be called, tends to raise the minimum living level which parents feel is necessary before they can "afford" to have children

50 Thus, while *per capita* income growth increases the resources available to households, it also affects the consumption aspirations which persons acquire in their economic socialization Moreover, since the

[28] P Lindert, "The relative cost of American children", *Graduate Program in Economic History* (Madison, The University of Wisconsin Madison, 1973) paper EH 73-18

[29] H Rosovsky and K Ohkawa, "The indigenous components in the modern Japanese economy", *Economic Development and Cultural Change*, vol IX, No 3 (April 1961), pp 476-501

[30] J S Banks, *Prosperity and Parenthood A Study of Family Planning among the Victorian Middle Classes* (London, Routledge and Kegan Paul, 1954), R A Easterlin, "Towards a socioeconomic theory of fertility . ", H Leibenstein "The economic theory of fertility decline", *Harvard Institute Economic Research Discussion Paper No 2* ambr' Massachusetts, Harvard University, 1973).

escalation in consumption aspirations is itself a reflection of actual income growth, this means that the adverse taste effect of such growth tends to be strong enough, on the average, to wash out the positive income effect. (Over shorter periods, however, the two effects of income growth may get out of phase, producing fluctuations in fertility.[31]) The taste effect of income growth operates within generations as well as between them.

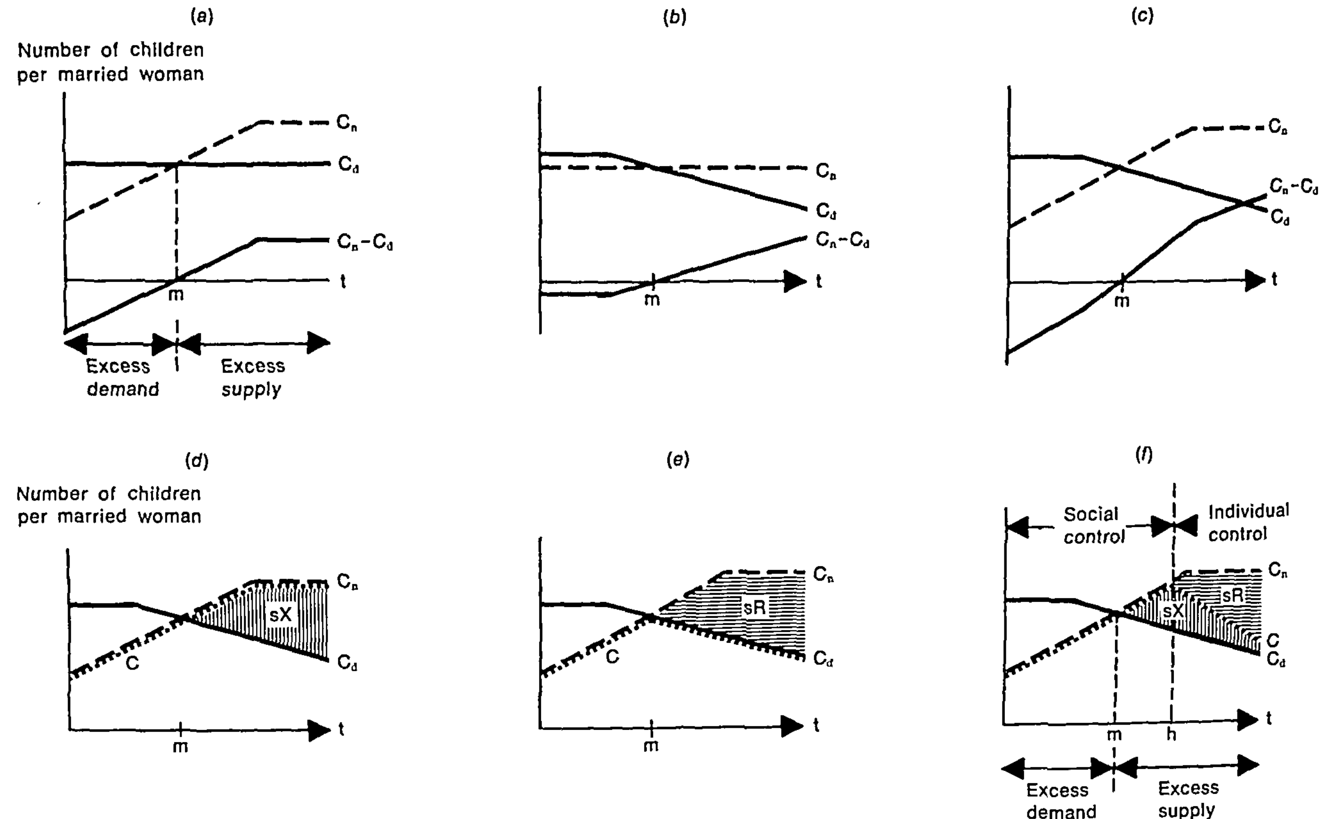
51. The foregoing effects of *per capita* income growth operate through the demand for children. As has been stated, *per capita* income growth may also affect potential output of children, especially in the early stages of modernization. In terms of personal consumption experience of the population, *per capita* income growth typically comprises, among other things, substantial advances in food, clothing and shelter. The consequent improvement in resistance to disease and reduction in exposure to disease are likely to raise the fecundity of women and increase prospects of infants surviving to adulthood. These influences are shown in the table by the positive signs entered in columns 4 and 5 of row 5.

A MODEL OF THE EFFECTS OF MODERNIZATION ON FAMILY REPRODUCTIVE BEHAVIOUR

52. The preceding section suggests a number of specific ways that modernization affects the demand for children, potential output of children, and costs of fertility control. These influences are brought together in figure II to develop a schematic model of the impact of modernization on family reproductive behaviour. In figure II, the solid line C_d curve refers to the desired number of surviving children of the representative

[31] R. A. Easterlin, *Population, Labor Force, and Long Swings in Economic Growth: The American Experience* (New York, Columbia University Press, 1968).

Figure II. Hypothetical trends in fertility variables associated with economic and social modernization



Legend

The following definitions all refer to the total number over the reproductive career of the "representative" household:

— — — — C_n is the number of surviving children parents would have in an unregulated fertility régime

———— C_d is the desired number of surviving children in a perfect contraceptive society

············ C is the actual number of surviving children

sX is unwanted children, the excess of the actual number of children over the desired number

sR is the degree of voluntary fertility regulation, measured in terms of children averted

household and the broken line C_n curve, to the potential output In all of the diagrams, the progress of modernization is assumed to be correlated with time, and corresponds to a rightward movement along the x-axis Note that in contrast to figure I, the magnitudes plotted here refer to surviving children, not to births.

Effects on the motivation to regulate fertility

53 Diagrams II(a) through II(c) sketch alternative ways in which the motivation to deliberately limit fertility tends to grow as a result of modernization In II(a), the influences on the potential output of children, summarized in columns 4 and 5 of the table, are shown by the upward movement of the C_n curve, which eventually levels off as modern health and living levels are established. It is assumed that the several factors in the table operating to increase potential output outweigh, in the long run, the one tending to decrease potential output Even with desired family size remaining constant (C_d horizontal), the net balance of potential output *versus* desired size shifts in an excess supply direction, as shown by the $C_n - C_d$ curve at the bottom of the diagram. To the right of point m, the typical household is in the situation of potentially producing more children than it wants. Hence, it has an incentive to limit fertility in order to avoid unwanted children This provides an illustration of how public health programmes, which at first raise the population growth rate through their impact on survival prospects, tend eventually to a motivation for lower fertility and, thus, reduced population growth

54. Diagram II(b) illustrates how the demand influences, in columns 1-3 of the table, tend to bring about excess supply conditions, even if potential output remains unchanged The net balance of the demand influences in the table is taken to be negative, despite the positive sign for the income effect, since as was noted, the latter tends to be balanced out, on the average, by the intergenerational taste effect. In the diagram, the C_d curve is at first horizontal, a condition which would occur if the new demand influences began to make themselves felt only some time after the modernization process had begun

55 Diagram II(c) illustrates the most likely circumstance, that in which influences on both potential output and desired family size are acting in a mutually reinforcing way to bring about a motivation to regulate fertility as modernization progresses. Because of this the $C_n - C_d$ curve, which shows the net balance of potential output and demand influences, shows a more pronounced upward movement In the subsequent diagrams in the figure, the demand and output conditions shown in diagram II(c) are assumed to apply, and for simplicity the $C_n - C_d$ curve depicting the net balance between the two is omitted.

56 The pre-modern situation, shown in all diagrams of figure II, is one of excess demand, that is, parents are unable to produce as many children as they would like. There is some evidence that such conditions may prevail in some less developed areas.[32] However, the present analysis could readily be modified to take account of other pre-modern circumstances Thus, one might assume that the C_d and C_n curves are superimposed on the pre-modern section of the diagram, that is, that parents at first have just as many children as they would like. Or one might assume that C_n exceeds C_d by a small margin, but that pronounced fluctuations in fertility give rise to so much uncertainty among parents about realizing their family size desires that they act as though they are in an excess demand situation, even though the actual situation over the long run is one of excess supply Another variant would be a situation in which excess supply conditions and deliberate fertility control exist among a small segment of the population, but the bulk of the population is in an excess demand condition In all cases, the only critical point is that modernization results in substantially increased prospects of unwanted children among the mass of the population

Costs of fertility regulation

57 As previously stated, in an excess supply situation, the number of children parents actually have depends upon how the motivation to regulate fertility balances against the costs of fertility control. In seeking to determine the likely course of the actual number of children during modernization, it is necessary to consider these costs Three alternative situations are considered in which fertility control costs remain fixed at different assumed initial levels, and then the effect of the changes in costs are described

58 Diagrams II(d) and II(e) illustrate the two extremes with regard to costs of fertility regulation Diagram II(d) represents the situation in which fertility control costs are prohibitive—one might imagine a situation, for example, in which no one knows how to control fertility. Diagram II(e) represents the situation in which there are no subjective or market costs of fertility control, the "perfect contraceptive society" As shown in diagrams II(d) through II(f) the trend in motivation to control fertility is assumed to be that shown by the $C_n - C_d$ curve in diagram II(c) In both diagrams II(d) and II(e), to the left of point m parents are not able to have as many children as they would like to have As a result, in this range the actual number of children they have, shown by the dotted C line, is equal to the maximum amount they can produce, as indicated by the C_n curve, and rises as potential output increases As one moves to the right of point m in both diagrams, a problem of unwanted children emerges, giving rise to the motivation to regulate fertility. In diagram II(d), where the costs of fertility regulation are prohibitive, the curve for the actual number of children, C, continues to follow the potential output curve, C_n, and unwanted children increase. The number of unwanted children is shown by the vertical distance between C

[32] R. B Tabbarah, *loc. cit*

and C_d, marked sX. On the other hand, in diagram II(e), the situation of the "perfect contraceptive society" where subjective and market costs of fertility regulation are zero, as soon as the motivation to regulate fertility occurs, parents immediately so do. The actual number of children, C, falls short of the maximum possible, C_n, and follows the C_d curve, turning downward in the case shown. The extent of fertility regulation, measured in children averted, is shown by the vertical sR distance between C_n and C. (s is the survival rate from infancy to adulthood and is used here to convert the excess fertility and births averted magnitudes of figure I into numbers of children.)

59. In any real world situation, fertility control costs would be neither zero nor prohibitive. The likely course of the actual number of children for a given level of fertility costs, intermediate between those represented in diagrams II(d) and II(e), is shown in diagram II(f). At first, as the potential output curve, C_n, edges above the desired number of children, C_d, to the right of point m, the motivation to regulate fertility is not great enough to offset the costs, and the actual number of children continues to be governed by the C_n curve, with unwanted children increasing as shown by sX. As the rightward movement continues, however, a point is reached at which the loss in welfare due to unwanted children begins to exceed that associated with the costs of fertility regulation. In effect, a "threshold" of deliberate fertility control, marked h in the diagram, is reached.[33] Fertility regulation is introduced and the C curve turns downward in the direction of C_d curve, with fertility regulation practised to the extent shown by the vertical distance sR. As long as costs of fertility regulation are positive, however, there will continue to be some unwanted children, indicated by sX. This is the price parents pay for their reluctance to bear the psychic and market costs of fertility regulation.

60. A reduction in fertility control costs during modernization, due to the factors shown in columns 6 and 7 of the table, would, other things being equal, shift the threshold point h to the left, increasing fertility regulation and reducing the number of unwanted children at any given time t. A steady down-trend in fertility control costs would cause the fertility decline to occur earlier and be steeper in magnitude than would otherwise be the case. In a perfect contraceptive society with zero fertility control costs, the threshold point h would be identical with point m, that is, prevention of births would occur immediately on the emergence of excess supply conditions, and the C curve beyond point m would be identical with the C_d curve, as shown in diagram II(e).

61. Note that the threshold point, h, depends not upon any given values of C_n and C_d, but upon the difference between the two. As is clear from diagrams II(a) through II(c), quite different combinations of C_n and C_d can yield the same degree of motivation. The threshold point will also vary with the costs of fertility control. There is, thus, no *a priori* reason to expect the threshold of fertility control always to occur at the same stage of modernization, for quite different threshold points may arise from different combinations of C_n, and C_d, and the costs of fertility control.

The general pattern

62. Figure I identified the principal trends in family reproductive behaviour associated with the process of modernization, namely, declines in observed and desired fertility, and an increase in conscious fertility control by the individual household. The table and figure II attempt to clarify the channels through which modernization operates to produce these trends. A summary statement of the process is, perhaps, appropriate at this point.

63. First, there is a pre-modern situation in which the representative household is in a situation where there is no motivation to limit fertility, since parents are uncertain about being able to have as many children as they would like to have. (As stated, this "typical" situation is consistent with the deliberate regulation of fertility among a limited segment of the population.) Until the threshold of fertility regulation is reached, the number of children parents have is governed by the factors determining C_n, specifically natural fertility and child survival prospects. Indeed, since modernization typically exerts a positive impact on each of these factors, there may be a tendency for actual family size to increase during the early phase of modernization. Some evidence of such increases has been found.[34] In this early stage of modernization, while desired family size and the costs of fertility regulation may be changing in a negative direction, these factors are unlikely to influence actual family size, because the typical household has not yet felt a motivation for fertility control sufficient to overcome the costs. Here is an example of a situation in which the establishment of a family planning programme would meet with little or no response, because there is insufficient motivation among

[33] D. Kirk, "A new demographic transition?", in National Academy of Sciences, *Rapid Population Growth* (Baltimore, Maryland, Johns Hopkins Press, 1971), vol. II, pp. 123-147; *Conditions and Trends of Fertility in the World* (United Nations publication, Sales No. 64.XIII.2).

[34] O. A. Collver, *Birth Rates in Latin America: New Estimates of Historical Trends and Fluctuations* (Berkeley, University of California, Institute of International Studies, 1965); J. Hurault, "La population des Indiens de Guyane française", *Population*, vol. XX, No. 5 (September-October 1965), pp. 801-828; J. Mandle, *Population and Economic Growth in Guyana, 1838-1960* ((Philadelphia, Pennsylvania, Temple University Press, 1974); P. O. Olusanya, "Modernization and the level of fertility in Western Nigeria", *International Population Conference, London, 1969* (Liège, International Union for the Scientific Study of Population, 1971), vol. I, pp. 695-711; G. W. Roberts, "Fertility in some Caribbean countries", *International Population Conference, London, 1969*, vol. I, pp. 812-824; G. W. Roberts, "Some demographic considerations of West Indian federation", *Social and Economic Studies*, vol. VI, No. 2 (1957), pp. 262-285; E. Shorter, "Women's liberation, birth control and fertility in European history", paper presented at the annual meeting of the American Historical Association, December 1971.

the public to regulate fertility.[35] Nevertheless, decreases in desired family size and the costs of fertility control would move the threshold of fertility regulation closer

64 Eventually, as modernization progresses, the typical family moves across the threshold of fertility regulation, and fertility turns downward as deliberate control of fertility expands In part, as just stated, this may be due to a gradual reduction in the desired family size and in the costs of fertility regulation In part, it is caused by the increase in potential output itself, which increases motivation for fertility control by raising progressively the family's prospective number of unwanted children. In this sense, developments raising the potential output of children are partially self-correcting, since, as they continue, they tend eventually to induce the adoption of fertility regulation and thereby a reduction in family size Moreover, with regard to the effect of an increase in child survival prospects, a downward influence on fertility is exerted over and above that working through completed family size For households to achieve a given number of surviving children, the necessary number of births would be lower, the better the prospect of infant and child survival. Because of this, one would expect the downward movement in fertility, due to increased child survival prospects, to be greater than that in completed family size, once fertility regulation is adopted

65 The present scheme helps bring out the way in which different economic and social programmes influence fertility Although in the short run, health programmes may raise fertility through their effect on natural fertility, eventually they induce a decline in fertility, as households become aware of an excess fertility problem and as the motivation to regulate fertility emerges. As Tabbarah has pointed out, without such motivation, family planning programmes are fruitless [36] However, once such motivation exists, family planning services can hasten the decline in fertility through their impact on the costs of fertility regulation Neither health nor family planning programmes, however, would ordinarily change C_d, desired family size. The latter, as Kingsley Davis has emphasized, calls for changes in the economic and social environment.[37] Examples would be policies in the areas of economic development and education, which lead to the emergence of new living-level aspirations and new role models among the public, and which, thereby, reduce family size desires by raising the value of life-styles competitive with having children The question of the appropriate policies for reducing fertility, therefore, is not an either-or matter, but one of the optimal policy mix

[35] R B Tabbarah, *loc cit*, R. B Tabbarah, "Birth control and population policy", *Population Studies*, vol XVIII, No. 2 (November 1964), pp 187-196

[36] R B Tabbarah, "Birth control and population policy", *loc cit*

[37] K Davis, "*Population policy. will current programs succeed?*", *Science*, vol CLVIII, No 3802 (10 November 1967), pp 730-739

66 Lastly, it should be mentioned that diagram II(*f*) helps distinguish between the two modes of fertility regulation described in the earlier quotation of Bourgeois-Pichat. The threshold point *h* in diagram II(*f*) may be thought of as the dividing line To the left of point *h*, fertility is "regulated" by a variety of social and biological mechanisms working through natural fertility Fertility is not yet viewed by the household as involving a potential problem of unwanted children, and is, in effect, outside the standard household decision-making calculus The modernization process, which shifts the typical household to a position to the right of point *h*, causing a fundamental change in the circumstances of family reproduction, moving the household from a situation where child-bearing is a matter "taken for granted" to one posing *difficult problems of individual* choice concerning the limitation of family size To the left of point *h*, although there is a demand for children, the usual demand mechanisms emphasized in the economic theory of fertility do not influence fertility, though fertility may be affected by economic variables raising or lowering potential output The explanation of fertility in such a situation calls for inquiry along these lines by sociologists and other students of natural fertility. To the right of point *h*, the household decision-making approach of economics comes into its own. Even here, of course, sociology still has an important part to play, particularly in the investigation of taste formation To dramatize this contrast, the sections to the left and right of point *h* in diagram II(*f*) have been labelled, respectively, "social control" and "individual control", following Bourgeois-Pichat's terminology Such sweeping distinctions are never fully satisfactory. Social sanctions are operative in both pre-modern and modern circumstances, while the idea that there is no individual choice whatsoever in a pre-modern society is too strong Moreover, no society shifts *en masse* at a single point of time from the "social" to "individual" control situations The real world process would inevitably be characterized by timing differences between various groups in the population

67 The proposition that there is a change in the basic nature of fertility regulation should not be confused with the view expressed by some writers that rational attitudes towards human reproduction emerge only with modernization In the present analysis, pre-modern reproductive behaviour is rational in the sense that the means are appropriate to the end. Given a conception of the problem as one of having enough surviving children, maximization of output within the existing set of biological constraints and established social practices makes sense. The process of modernization alters not the rationality of the individual, but the nature of the problem, from one of having too few children to one of having too many. Perception by individual households of this change in the nature of the problem and the devising of means to cope with it would hardly be expected to be instantaneous—hence, the persistence of high fertility in circumstances where

it is no longer needed. But this lag in the adjustment of fertility is a temporary one and is understandable, given the turn-around that has taken place in the nature of the problem, and is no evidence of irrationality.

68. It is possible that the emergence of a pressure for fertility limitation is one of the first forms in which modernization impinges directly on the mass of the population. The appearance of a problem that had not previously existed, that of limiting family size, and, thereby, of a need for decision-making of an entirely new sort, gives rise to a pressure for attitudinal changes in a fundamental and immensely personal area of human experience. From this point of view, the "population problem" may have positive consequences, by contributing to modernized attitudes that may more generally favour economic and social development. The presence of appropriate family planning services may facilitate this shift and ease the psychological pressures on individuals by increasing the likelihood of resort to "modern" techniques of fertility regulation, rather than to cruder traditional methods.

The variability of experience

69. The foregoing sketch attempts to bring together the variety of factors operating to induce changes in family reproductive behaviour during modernization. There is, of course, no necessity for these factors to operate simultaneously or with equal force in all real world situations. While the basic economic and social changes listed in the table have invariably occurred in all countries which have modernized, their relative timing has by no means been uniform. Moreover, the economic changes are usually more protracted, whereas social changes in public health and compulsory elementary education may be more concentrated temporally. One would expect, therefore, considerable variability in the patterns of change in reproductive behaviour actually observed.

70. By making different assumptions concerning changes in the basic fertility determinants, it is possible to generate with the present framework a variety of patterns of change, as may be illustrated with reference to the shift from high to low fertility. The typical demographic transition pattern—a shift from high to low mortality preceding a corresponding movement in fertility[38]—may be most simply generated, if, with other fertility determinants given, one assumes mortality is sharply reduced in a situation beginning with high mortality and fertility. The accompanying increase in child survival prospects, and perhaps also in natural fertility of mothers due to better health, would raise C_n, shifting the typical household into an excess supply situation of the type shown to the right of point m in diagram II(a). As the prospect of unwanted children continued to grow, the typical household would, in time, reach and cross the fertility control threshold h, and fertility rates would begin to move downward, thus following with a lag the decline in mortality.

71. Coale has remarked on situations in which the fertility decline accompanied or preceded the mortality decline.[39] Such a pattern could arise from changes in the economic and social structure, which give rise to unwanted children by shifting C_d below a given C_n, in the manner shown to the right of point m in diagram II(b). In this case, a fertility decline might be induced in the absence of or contemporaneously with a mortality decline.

72. As these examples show, there is no necessity for any one aspect of modernization, such as mortality decline, to exhibit an invariant timing pattern in relation to actual fertility. Many scholars have emphasized that the fertility movements actually observed as different countries modernize are highly variable.[40] The present model points to a number of reasons for this. The initial pre-modern conditions, such as levels of desired family size, potential output of children and fertility control costs, may differ among countries. So too may the historical trend in a particular aspect of modernization, such as the rapidity with which the movement towards universal elementary education takes place. Again, the various factors may come together in different combinations; for example, in one case economic development may substantially lead social modernization, and in another, the opposite may be true.

73. One may ask whether the same framework can encompass both the historical experience of the developed countries and the current experience of less developed countries; and whether it is likely that today's less developed countries will experience the same pressures for fertility reduction that emerged in the developed countries. The answer to this is yes, because the same aspects of modernization, listed in the table, that gave rise to these pressures in the developed countries are occurring in today's less developed countries. Advances in public health and education are occurring at an earlier time in relation to economic modernization than was true of the developed countries. Moreover, new influences are at work that were previously absent, for example, government family planning programmes,

[38] F. W. Notestein, "Population—the long view", in T. W. Schultz, ed., *Food for the World* (Chicago, Illinois, University of Chicago Press, 1945), pp. 36-57.

[39] A. J. Coale, "The decline of fertility in Europe ...", *loc. cit.*

[40] *Ibid.*; A. J. Coale, "Factors associated with the development of low fertility ...", *loc. cit.*; J. D. Durand, "Demographic transition", *Contributed Papers, Sydney Conference, Australia, 21-25 August 1967* (Liège, International Union for the Scientific Study of Population, n.d.), pp. 32-35. Attempts to establish typologies of the demographic transition are common, as in D. O. Cowgill, "The theory of population growth cycles", in J. J. Spengler and O. D. Duncan, eds., *Population Theory and Policy* (Glen Cove, New York, The Free Press, 1956), pp. 125-134; R. Mackensen, "Theoretical considerations regarding differential transition", *Contributed Papers, Sydney Conference, Australia, 21-25 August 1967*, pp. 37-46; Z. Pavlik, "Les problèmes de la révolution démographique", *Contributed Papers, Sydney Conference, Australia, 21-25 August 1967*, pp. 56-59.

mass media in the form of television and new modes of fertility regulation such as the IUD [41]

74. *Substantial differences in historical patterns* of fertility change may arise, not only from variations in the secular factors at work, but from differential fluctuations as well In pre-modern conditions substantial variations in fertility occur in connexion with movements in natural fertility due to epidemics, famines and similar events. Further, as has been stated, the establishment of modern health conditions and living levels may give rise to a temporary surge in actual fertility as fecundity rises In modernizing societies, pronounced fluctuations have been observed in conjunction with migration movements and economic conditions While the taste and income effects of income growth may cancel out over the long term, they do not necessarily do so over shorter periods, and disparities between the two may be responsible for the "baby booms" observed in the United States of America and elsewhere after the Second World War [42]

75. One must recognize, too, that, at any given time, various groups in a society are in different circumstances, and different factors may be responsible for changes in their fertility. For example, whereas the effect of an increase in the survival prospects of children might be especially felt by those in the older reproductive ages, a change in the factors underlying desired size might have a greater effect on those in the younger ages.

76. Instead of the demographic transition model, there is need for an analytical framework sufficiently flexible to accommodate an explanation of the wide variety of historical and ongoing trends, fluctuations and differentials in the shift from pre-modern to modern fertility levels The present framework is an attempt to meet this need.

[41] L Tabah, "La contraception dans le Tiers Monde", *Population*, vol XXII, No. 6 (November-December 1967), pp 999-1030, E van de Walle and J Knodel, *loc cit*

[42] R A Easterlin, *Population, Labor Force, and Long Swings in Economic Growth The American Experience, loc cit*

REPRODUCTIVE BEHAVIOUR AND THE FAMILY LIFE CYCLE*

*Norman B. Ryder***

1. The purpose of this paper is to develop measures that are appropriate for studying the micro-demography of the family, to present the results of their application to three population types, and to discuss some implications of those findings. It is probably appropriate to begin with an apology for a paper which, like the present one, utilizes artificial rather than real data, and sacrifices much of the rich variety of family life in an effort to achieve precision. Yet the statistics discussed here are rarely available and where some approximations exist their quality is suspect and their coverage limited parochially. Accordingly, it seems not only worth while, but also necessary, to resort to simulation and to make partial amends by taking pains to indicate, *passim*, some of the ways in which the results of the models may depart significantly from reality.

THREE REPRODUCTION MODELS

2. The models developed here have been designed to capture the essence of three classic demographic situations: high mortality and high fertility, here labelled "high equilibrium"; low mortality and high fertility, called "disequilibrium"; and low mortality and low fertility, called "low equilibrium". It is a demographic commonplace that the situation of high equilibrium has characterized most of man's life everywhere on earth, *mutatis mutandis*, although it would probably be more accurate to state that there have been many shifts of populations back and forth between high equilibrium and (positive or negative) disequilibrium. Recently, there has been a new scenario in many populations, with the movement from disequilibrium to low equilibrium. That kind of change may be irreversible; the major question facing the populations of the world is whether that new scenario can be made universal.

3. The first task in constructing the models was t characterize the mortality appropriate to the thre situations. To represent the high mortality of the "hig equilibrium" model, the female and male life tables identified as "West-3" in the Coale/Demeny collection were selected.[1] These table ave expectations of life at birth of 25 for females and of 22.85 for males. To characterize the mortality of the "disequilibrium" model, "West-17", with expectations of life at birth of 60 for females and of 56.47 for males, was selected. Lastly, for the "low equilibrium" model, "West-23", which has expectations of life at birth of 75 for females and of 71.19 for males, is used. Except for numerical assumptions about the sex ratio at birth and about the distribution of completed fertility by duration and parity, all statistics reported in this paper are derivative from these life tables.

4. As the paper is concerned with families, it begins the discussion of fertility with a set of assumptions about nuptiality. Briefly and simply, a monogamous system is assumed, in which all women marry at age 20, all men marry at age 25, and there is no exposure to risk of fertility outside of marriage. The levels of fertility are selected to meet the following criteria: for high equilibrium, a level of fertility just sufficient to ensure replacement vis-à-vis the survival functions of females and males (and also the marriage and remarriage rules, as discussed below); for disequilibrium, the same level of fertility as used for high equilibrium; for low equilibrium, a level of fertility just sufficient to ensure replacement in terms of its survival functions.

5. In order to distribute fertility over the course of the family life cycle, it has been decided to work with successive marital durations, rather than ages, since the former seems a more appropriate temporal variable for family analysis. Specifically, it is assumed that gross fertility (exclusive of survival) is distributed by five-year duration groups (0-4, 5-9, . . . , 20-24) as follows: in the high-equilibrium and disequilibrium types, 7/25, 6/25, 5/25, 4/25, 3/25, respectively; in the low-
ibrium type, 7/16, 5/16, 3/16, 1/16, 0/16,
vely. Alth t is obvious that one criterion
g th ar distributions was simpli-
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* The original text of this p 60/SYM.II/8)
was submitted to the Sympo n and the
Family, Honolulu, 6-15 August

** Office of Population Re niversity,
Princeton, New Jersey, United S

[1] Ansley J. Coale and Paul De l Life
Tables and Stable Populations (ton
University Press, 1966).

3 2 per cent per annum (because the birth rate is 42 and the death rate 10). This epitomizes the lot of most developing countries. The third model, low equilibrium, is again a stationary population, with birth and death rates equal at a little less than 14 per 1,000 per annum This resembles closely the intrinsic condition of most developed countries

7. The basic parameters are recorded in table 1, showing for comparison two polar assumptions concerning remarriage. These statistics were developed in the following way The high-equilibrium situation begins with the assumption that the net reproduction rate equals 1.0 (the technical meaning of replacement) The second-to-last column, child survival, is the proportion of females surviving to marriage age. Then the net level of fertility, G, required to counterbalance child non-survival, and thus replace each woman (as of age at marriage), is the reciprocal of the product qS, where q is the proportion of births which are female (assumed to be 20/41) In order to derive the appropriate gross level of fertility, F, from the net level, G, one must know the value of L, the parental survival, since $G = FL$. The value of L is the weighted mean of the survival proportions in each duration, where the weights are the relative amounts of duration-specific fertility, and the individual survival proportions represent the women who are exposed to the risk of fertility by virtue of being married

TABLE 1 REPRODUCTION PARAMETERS UNDER CONDITIONS OF NO REMARRIAGE AND COMPLETE REMARRIAGE

Condition	Gross level of fertility $F = G/L$	Parental survival L	Net level of fertility $G = R_0/(qS)$	Child survival S	Net reproduction rate R_0
No remarriage					
High equilibrium	6.4838	0 69054	4 4774	0 45786	1.0
Disequilibrium	6.4838	0 91134	5 9090	0 87010	2 5079
Low equilibrium	2.1202	0 98818	2 0951	0 97846	1.0
Complete remarriage					
High equilibrium	5.3608	0 83520	4.4774	0.45786	1.0
Disequilibrium	5.3608	0 95794	5 1455	0 87010	2 1821
Low equilibrium	2 1038	0 99590	2.0951	0 97846	1.0

8. The concept of the net reproduction rate has been modified to make it more useful for family demography. The net reproduction rate is conventionally described as the product-sum of the female age-specific fertility rates and the proportions of women surviving from birth to the age in question. In the present models, which are oriented to marital fertility, duration rather than age has been used; and, in effect, the survival component of the conventional net reproduction rate has been divided into two parts, parental survival (from duration zero to each successive duration within the fertile span) and child survival (from birth to marriage age, which will be duration zero for the next generation of women)

9. The data may be used to examine a question of great importance in many cultures: the probability of a male heir Suppose a male heir is defined as a son who survives to marriage age. Then it may be shown that the proportion of women of Nth parity (those who end up with N live births) who have no surviving son in that sense, is $(1 - ps)^N$, where p is the proportion of births which are male (21/41) and s is the proportion of male births which survive to marriage age. The value of $(1 - ps)$ for the three models is 0 784 for high equilibrium; 0 572 for disequilibrium, and 0.453 for low equilibrium It is apparent that the level of mortality bears importantly on the question.

10. In order to determine the over-all proportion of women who fail to have a male heir, it is necessary to make some assumption about the complete (live birth) parity distribution of women After considerable experimentation, a "triangular" distribution has been chosen in which the proportion ending with x births is $2(w + 1 - x)/((w + 1)(w + 2))$, where w is the highest parity attained ($w = 3$?) This is suitable for representation of high fertility parity distributions For the low-equilibrium model, it has been arbitrarily assumed that the proportions ending in parities 0, 1 2, 3, 4 are 10 per cent, 20 per cent, 30 per cent and 10 per cent, respectively

11. The outcome of these calculations is that the proportion of marriages failing to produce a male heir in the high-equilibrium situation, is 44 per cent. The proportion is 21 per cent in the disequilibrium context and 32 per cent for low equilibrium. Considering the high salience of this concern in many populations, the circumstance that the proportion without a surviving son, under high equilibrium conditions, is as high as 44 per cent is surely a matter of considerable importance for family analysis. Moreover, the circumstance that the proportion falls to 21 per cent when mortality declines and disequilibrium is produced constitutes a powerful support for continued high fertility. The value in the low equilibrium context is probably less significant from a sociocultural standpoint, since a decline in the importance of a male heir is a likely correlate of the typical social transformations involved in the approach to a low demographic equilibrium.

12. As a methodological foot-note, it is approximately the case that the proportion of couples with no surviving son, in a high fertility situation, is $2PQ$, where $P = 1/(3R_0)$. For example, a net reproduction rate of 1 (as in high equilibrium) would with this formula give a value of 4/9, which is approximately the 44 per cent calculated from a detailed parity distribution. Simply speaking, then, the probability of a male heir varies directly with the net reproduction rate. In a low-fertility situation, on the contrary, the key determinant is the variance in completed fertility.

13. Returning now to the discussion of table 1, note that the L values in the upper panel (no remarriage) are less than those in the lower panel (complete remarriage), especially for high equilibrium. If it is assumed that there is no remarriage, the consequence is that a woman departs from exposure to risk if either she or her husband dies. Thus, the L values in the upper panel represent the outcome when joint survival of husband and wife is used in developing the calculations. If, on the other hand, the assumption is that every widow remarries, and does so immediately upon dissolution of her marriage, then women remain exposed to risk so long as they survive, and the appropriate survival proportions in this case are those of the woman alone.

14. In the situation of no remarriage, a gross level of fertility of $F = 6.5$ is needed to achieve replacement, because of the low level of child survival ($S = 46$ per cent) and of joint parental survival ($L = 69$ per cent). Holding this gross level of fertility constant, as in the disequilibrium model, but lowering mortality, has the consequence of propelling the net reproduction rate upward from 1.0 to 2.5. In the situation of complete remarriage, on the other hand, the gross level of fertility required for high equilibrium is $F = 5.4$, because the survival for the wife alone ($L = 84$ per cent) is so much higher than that for husband and wife together. With that level of fertility, the disequilibrium situation would have a much lower net reproduction rate (2.2), the birth rate would be 36 rather than 42, and the growth rate would fall to 2.6 per cent per annum.

15. The "no remarriage" assumption is employed throughout the remainder of this paper. All societies are in fact arrayed on a continuum between the polar positions of no remarriage and complete remarriage (just as they depart more or less from universality of marriage). The "efficiency" of remarriage behaviour is a function of both the probability that a widow will remarry and the length of time between the dissolution of one marriage and the formation of the next. The relevance of the efficiency of remarriage for determining how much fertility is required for replacement varies strongly with the level of mortality. In the low-equilibrium model, for example, the respective values of L are essentially the same—98.8 per cent for no remarriage, and 99.6 per cent for complete remarriage. (Obviously, marital dissolution occurs for reasons other than death of spouse and the incidence may be high in some countries. The question of the efficiency of remarriage after divorce is important in that context, but the subject falls outside the scope of the present paper.)

16. One concealed detail of the model casts some light on the demographic influences on male and female marriage and remarriage. The specification that all females marry at 20 and none remarry, and that all males marry at 25 does not make explicit whether there are sufficient males at age 25 to provide spouses for all females at age 20. In fact, in the populations implicit in these three types, there is an 8 per cent shortage of males in high equilibrium, a 14 per cent shortage in disequilibrium, and a 3 per cent surplus in low equilibrium. As mortality declines, the absolute difference between male and female survival diminishes, and an ever more dominant role in the relative numbers of the sexes is played by the 5 per cent surplus of males at birth. The reason the disequilibrium situation shows a departure from this general principle (which would have predicated a 1 per cent surplus of males in terms of mortality considerations alone) is that it is a stable population, growing at 3.2 per cent per annum. Accordingly, since males are five years older than females at marriage, a shortage of 15 per cent (1 — $e^{-5(0.032)}$) is generated.

17. There are two directions, in a monogamous society, in which all females can be married at age 20: (*a*) reduction of the age difference between brides and grooms; (*b*) marriage of some spinsters to widowers. In the high-equilibrium situation, the first of these modifications would require reducing the age difference to zero. There are almost certainly social and economic reasons why this strategy would generally be unacceptable. In order to discuss the feasibility of the second approach, the probability of marital dissolution for each of the three population types has been calculated. The mean durations at dissolution for the three population types are 12, 14 and 16 years, respectively. It is apparent that, unless there is remarriage in the high-equilibrium context, or fusion with another household, a very substantial number of children will be raised in households with only one parent. Note also that substantially more widows than widowers are created, suggesting substantial scope for polygyny (see table 2).

TABLE 2. OUTCOME OF 100,000 MARRIAGES
(First 25 years)

	Number of couples surviving	*Number of widows created*	*Number of widowers created*
High equilibrium	31,832	38,100	30,068
Disequilibrium	75,683	14,304	10,014
Low equilibrium	92,802	4,825	2,373

18. Returning now to the question of the feasibility of marriage of some spinsters to widowers, in the high-equilibrium context, in order to preserve universality

of female marriage, it is apparent that, since 30 per cent of the marriages produce widowers (in the age span from 25 to 50), there is no difficulty of supplying brides with widowers to compensate for the shortage of bachelors. Indeed, the supply of widowers in a high-equilibrium society is sufficient to permit a substantial amount of remarriage of widows as well.

19. In the disequilibrium situation, on the other hand, the deficit of males is 14 per cent, and only 10 per cent of the marriages produce widowers—a proportion which is scaled down to 6 5 per cent when discounted for the growth rate. Accordingly, it would seem to be very difficult in the disequilibrium context to achieve universality of female marriage at age 20 Furthermore, one implication of a net reproduction rate of 2 51 is that the number of marriages (under a rule that marriage is universal) would increase by 151 per cent each generation As there are external conditions which need to be satisfied in order to establish a marriage, and as other forces of change (such as increased education) may tend to delay marriage, it appears likely that the difference in age at marriage of husbands and wives may increase and exacerbate the deficit of males. In either circumstance, it is likely that the proportion of women married, in the disequilibrium situation, will be substantially less than 100 per cent It follows also that non-remarriage of widows is much more plausible than complete remarriage Accordingly, the level of the net reproduction rate, in the disequilibrium context has probably been over-estimated.

20 Once a marriage is dissolved by the death of a husband, there are three kinds of option available to the widow and her children:

(*a*) She may remarry This may occasion a merger of two households, each with children, should she marry a widower The fertility consequence of exercising this option is that the widow continues exposed to risk Thus, the impact of mortality in this case is solely on the number of households, and not at all on fertility,

(*b*) The widow may not remarry, and choose to remain with her children in the same household The impact of mortality in this situation is solely on fertility, and has no effect on the number of households;

(*c*) The widow may not remarry, but move with her children into another already existing household, probably that of her or her husband's kin In this situation, the impact of mortality falls both on the number of households and on female fertility, because a household disappears, and the widow is no longer exposed to the risk of fertility.

21 The conventional approach to the question of household size is to describe a particular set of institutions or customs, and then determine the consequences of adhering to those customs in a particular demographic situation However, it is worth contemplating the possibility that the primary emphasis is on achieving a household of a particular size—not too large and not too small—and that practices are followed which, in a particular demographic context, achieve that objective, but which are abandoned when the demographic situation changes, because the desired household size is no longer achievable There is considerable scope for modification of household size by an alteration of the distribution of the choices made by widows among the three options just discussed, by transferring children from one household to another, by the earlier or later departure of unmarried children from the household, or by the fusion or fission of existing households which have more adults than one married couple. The considerable demographic differences between high equilibrium and disequilibrium, charted in this paper, may mislead one about realistic outcomes, because their implications are likely to provoke compensatory modifications of such customs

COMPONENTS OF FAMILY LIFE

22 Perhaps no concept is so often employed in demographic disquisitions as "family size"; yet the difficulties of defining and measuring it in a satisfactory way are almost insurmountable. In this section an approach is made to the question by considering the individual and joint person-years of life which are, so to speak, generated by a marriage, in the final section an attempt is made at resolution of the conundrum

23 The most common referent of the term, family size, is in fact the gross fertility level, that is, the mean parity of a woman who survives to the end of the reproductive period In this sense, the levels of family size are 6 5 for high equilibrium and disequilibrium, and 2 1 for low equilibrium Aside from the quibble that this measure excludes parents from the family, there are two serious difficulties with it The first of these is readily overcome, using procedures explained in connexion with table 1, by taking into account the extent to which parental non-survival reduces fertility per couple by using G rather than F (and add two for the parents) This measure gives 6 5 as family size in high equilibrium, 7 9 for disequilibrium and 4 1 for low equilibrium.

24 The second difficulty concerns the circumstances that the values just presented measure the frequency of persons who at any time are members of the nuclear family, but ignore the time dimension, i e., how long they are members If the family is to be thought of as a population, both dimensions need to be included in its quantification To this end, table 3 has been prepared, showing the number of years of life within the family represented by each type of family member In making this calculation, the maximum time span of membership has been set at 35 years for the parents, 25 years for the son and 20 years for the daughter. The choice of 35 years for the parents is an approximation of the length of time between their marriage and the marriage of their last child The time lengths for children correspond with the age at marriage assumptions.

TABLE 3. YEARS OF LIFE PER PERSON WITHIN APPROPRIATE DURATION LIMITS

	Father	Mother	Son	Daughter	Weighted total
High equilibrium	23.47	25.40	12.16	10.69	100.12
Disequilibrium	31.25	32.34	21.74	17.86	180.85
Low equilibrium	33.70	34.37	24.29	19.63	114.20

25. Although the rise in length of life within the designated duration spans of family participation is a simple reflection of the postulated decline of mortality, its representation in this way reveals the import of that decline for the size of the family, viewed as a population, that is, in person-years terms. The final column of the table represents a first approximation to family size in that sense. It is obtained by weighting the person-years for sons and daughters by pG and qG, respectively, where p is the proportion of births male, and then adding to the two products the person-years of parents. This provides a clear perspective on the population explosion as it is experienced at the family level: an increase in total person-years of some 80 per cent from high equilibrium to disequilibrium. As for low equilibrium, ordinarily characterized as the "small-family system", its family size is in fact appreciably larger than that for high equilibrium, that is, larger than family size must have been throughout most of human history.

26. Before proceeding further with this exercise, one phenomenon of considerable importance in distinguishing among the three population types deserves advertisement, namely, variability. The parameters presented in this paper have the tendency of any average to conceal the distribution being summarized. The extent to which individual experience differs from average experience is itself an important social fact, entirely aside from a parallel interest in differential fertility and mortality among aggregates like social classes or ethnic groups. Table 4 shows the standard deviations and the coefficients of variation (ratio of standard deviation to mean, expressed as a percentage) for the five measures employed in table 3.

TABLE 4. STANDARD DEVIATION, AND COEFFICIENT OF VARIATION (PERCENTAGE) OF NET FERTILITY AND OF FOUR MEASURES OF PERSON-YEARS OF LIFE

		Length of life in specified interval			
	Net fertility	Father (35)	Mother (35)	Son (25)	Daughter (20)
Standard deviations					
High equilibrium	4.31	11.56	11.55	11.62	9.26
Disequilibrium	4.81	7.87	7.04	8.03	5.88
Low equilibrium	1.14	4.55	3.32	4.07	2.62
Coefficients of variation					
High equilibrium	96	49	45	96	87
Disequilibrium	81	25	22	37	33
Low equilibrium	54	13	10	17	13

27. In estimating the standard deviations of net fertility, the same parity distribution has been used as was described in the account of the probability of having a male heir. Since the variance of the high fertility distribution is $G(G+1)/2$, the coefficient of variation necessarily varies inversely with the mean. However, that mechanical effect is very small compared with the observed differences. It would show a mere decline from 78 per cent to 76 per cent in a comparison of high equilibrium and disequilibrium. The reasons for the much higher values of the coefficient of variation, and for the much greater decline from high equilibrium to disequilibrium, is that not only the within-group variance provided by the formula is included for each duration of termination of childbearing, but the between-group variance, which is considerable for the high-equilibrium situation (as could be inferred from the high probabilities of marital dissolution reported in table 2).

28. The key finding is that considerable variability in every dimension of family size is a prominent characteristic of the high-equilibrium society. The larger the variability, the larger the proportions of very large and very small families, relative to the reported means. Otherwise stated, high mortality means a large role for chance in human affairs. Accordingly, it is likely that social customs to cope with its frequent intervention will be adopted. Among those customs, one may suggest that the extended kinship system, as a device for providing an insurance policy against the exigencies which may face any particular nuclear family, is a most important institutional development in the absence of any alternative organization for this purpose in the larger society. Furthermore, the most sensible orien-

tation of any family would be to err in the direction of too large rather than too small a family size, to avoid the probability of extinction or of falling below the critical number needed to maintain a viable household Lastly, the solution to the problem of a household which has become too large (by some criteria of organizational or other problems associated with large size) is fission, whereas the solution to the problem of the household which has become too small is fusion. From a sociological standpoint, the former appears to be a much simpler procedure than the latter. In brief, it is suggested that one of the important props for high fertility is the variance of fertility and mortality characterizing the high equilibrium situation

29 To conclude this discussion of variability, it is noted that, although it has been convenient from a modelling standpoint to employ one particular set of life tables in each case, implying constant probabilities of survival by age, it is highly likely that there is considerable variation in such probabilities over time, with long periods in which the average length of life may have been 40 or 50 years (rather than the average of 25 for females and 23 for males), interspersed with brief intervals in which mortality was catastrophically higher. Fertility would also be likely to follow a variable course through time Thus, a kind of temporal variance needs to be imposed on the dispersions mentioned here, adding further force to the argument

30 Returning to the question of the dimensions of family size, there has been considerable debate in sociology and social anthropology about how to define a family, particularly in connexion with the debate on the universality of the nuclear family. One direction of resolution of that debate is useful, because it suggests a battery of appropriate family demography measures The point is that efforts to define the nuclear family in concrete terms have raised very considerable difficulties and have led to the suggestion that attention should be concentrated on particular relational pairs which, *in toto,* make up the constellation of role-relationships known as the nuclear family These role-relationship pairs are, of course, husband/wife, father/son, father/daughter, mother/son, mother/daughter, brother/brother, brother/sister, and sister/sister. It is proposed to examine the quantity of life in such role-relationship pairs, in each of the three models. These dimensions of family demography may interest analysts concerned with the quality and salience of such relationships

31 First to be considered is the husband/wife pair Table 5 shows the mean lengths of life, individual and joint, within the first 25 years of marriage; this length of time was chosen because of its importance for fertility. The sharp contrast between individual and joint survival, in the high-equilibrium situation, and the large difference between its joint value and that of the other two models, are different ways of reporting the substantial incursions made by mortality on prospective fertility

TABLE 5 INDIVIDUAL AND JOINT HUSBAND/WIFE LIFE
(First 25 years of marriage)

	Husband	*Wife*	*Joint*
High equilibrium	19 24	20 08	15 89
Disequilibrium	23 40	23 79	22.31
Low equilibrium	24 56	24 77	24 34

32. One may also consider the husband/wife relationship in its totality, that is, in terms of individual and joint expectations of life of husband and wife Immediately it is seen from this table that the marriage contract, in the high-equilibrium situation, is actually rather short, lasting, on average, about 19 years, but that, as mortality declines, the length of joint life "till death do us part" becomes progressively and substantially longer As an interesting detail, the gap between expectation of life of the wife and the joint expectation of life remains approximately constant at 12 years (the years of widowhood) whatever the level of mortality, but the years of widowerhood, measured in a comparable fashion, become progressively fewer (as the gap between husband's and wife's expectation of life grows) (See table 6)

TABLE 6 INDIVIDUAL AND JOINT EXPECTATIONS OF LIFE AT MARRIAGE

	Husband	*Wife*	*Joint*
High equilibrium	26 55	31 25	19 20
Disequilibrium	41 59	48 44	35 84
Low equilibrium	48 72	56 59	45 22

33 Although much of the discussion of the family centres on reproduction, it seems more appropriate to regard the family's central function as socialization, since many alternative social arrangements for procreation are imaginable, but the family as a design for child-rearing has unique properties In table 7, we examined the years available for parent/child interaction in each of the models for the four nuclear family combinations The total possible years in each case are 20 if the daughter is involved and 25 if the son is involved. For the purposes of calculating parental survival, they are located at their mean ages of fertility (corresponding in the three models to durations 6 87, 10 03 and 6 86, respectively, to which are added 20 years for the mother and 25 years for the father) The table contains in the last column a weighted sum, divided by four because of the doubly duplicate representation. The weights are the mean numbers of sons and daughters in each appropriate case This table shows a tripling of the exposure to the parent/child relationship, between high equilibrium and disequilibrium. Furthermore, there is essentially no difference in family size, so measured, between the high equilibrium and the low equilibrium situations. One ventures the speculation that the magnitude of parent/ experience is a simple function of the ne rate.

TABLE 7. JOINT PERSON/YEARS OF PARENT/CHILD EXPERIENCE

	Mother/ daughter	*Father/ daughter*	*Mother/ son*	*Father/ son*	*Weighted sum/4*
High equilibrium	9.54	9.21	10.47	9.86	21.89
Disequilibrium	17.14	16.72	20.52	19.76	63.54
Low equilibrium	19.47	19.28	23.98	23.62	22.67

34. The final joint survival presentation considers sibling relationships. Here again there are four possible combinations (elder and younger brother and sister). An average difference between siblings of five years of age is specified. In keeping with the assumption that males remain within the family for a maximum of 25 years and females for 20 years, the length of time during which survival is counted becomes 20 years if the elder child is a male and 15 years if it is a female. The weighting scheme for the final two columns requires explanation. There are three components to each weight: (*a*) the total number of sibling combinations, which, following the parity distributions discussed above, is $G(3G-1)/4$ for the high-fertility models, and 1.8 for low equilibrium; (*b*) the proportion of elder children surviving to age five; (*c*) the probabilities of the different sex combinations (pp, pq, qp and qq, where $p = 21/41$ is the probability of a male birth). The means and their weights are presented in table 8. In some senses, this is the most remarkable table in the collection. Within the high-equilibrium model, the total amount of sibling interaction is modest, despite its high fertility. Within the disequilibrium situation, which has the same gross fertlity, the amount of sibling time for interaction is multiplied more than fivefold. Lastly, in the low-equilibrium population, the total amount of sibling time for interaction is, in comparison, minuscule. The mean years of sibling interaction per child are, however, approximately the same in the two equilibrium situations, but much larger in the disequilibrium situation. As was suggested for the comparable parent/child calculation, it is surmised that this is a simple function of the net reproduction rate.

TABLE 8. JOINT PERSON/YEARS OF SIBLING EXPERIENCE

Elder child/ Younger child	*Brother/ Brother*	*Brother/ Sister*	*Sister/ Brother*	*Sister/ Sister*	*Weighted total*	*Mean years per child*
Mean years of experience						
High equilibrium	9.92	10.38	8.02	8.38	67.23	15.02
Disequilibrium	17.31	17.71	13.22	13.43	339.64	57.48
Low equilibrium	19.42	19.56	14.64	14.74	30.20	14.41
Number of combinations						
High equilibrium	1.86	1.77	1.90	1.81		
Disequilibrium	5.71	5.45	5.55	5.28		
Low equilibrium	0.46	0.44	0.44	0.42		

THE MEASUREMENT OF FAMILY SIZE

35. In the foregoing text, measures of family size have been criticized which consider only the frequency with which persons can be found at any time within the bounds of the family definition, and the importance of incorporating the time dimension in the calculation has been suggested. The results of table 3 provided a measure of 100 person-years for high equilibrium, 181 person-years for disequilibrium and 114 person-years for low equilibrium. Although that measure has the preferred orientation, it is not without defects. The principal problem is that some of the years so counted for children may in fact be spent outside the family, in orphanhood (between the time of dissolution of their family of orientation and the time of formation of their family of procreation); and some of the years so counted for parents may be spent outside the time frame of the family as ordinarily understood (as, for example, in widowhood after the last child has married).

36. Then there was an examination of three facets of family composition—husband/wife, parent/child, and sibling/sibling joint person-years. Parent/child interaction is a sufficient but not a necessary condition for the existence of a family; husband/wife interaction is sometimes sufficient but never necessary; sibling/sibling interaction is neither necessary nor sufficient. The trouble with these component parts of the meaning of family life is that the strands of joint experience for each component overlap in time those of the other components, so that the family in its totality is, arithmetically speaking, something less than the sum of its parts. Lastly, the dimension of the measure is an unfamiliar one; the idea that a person who lives 70 years represents a population size of 70 (because population size is a sum of person-years) has not yet become familiar.

37. Resolution of the problem requires a clear definition of the nuclear family, so that one can identify unequivocally whether the family survives over any interval of time. A definition is going to be used here which is current in the literature on the family, but perhaps not employed for measurement purposes. A family will be considered as surviving so long as it contains at least one parent/child pair or, failing that, if it contains the possibility of a parent/child pair because both spouses survive and the wife is below her maximum duration of fertility. Thus, a husband and wife would be counted as a family in the part of their marriage prior to childbearing, but not after the last child had left home, two or more siblings would not constitute a family unless at least one parent was present.

38 A system of calculations has been developed to determine the length of life of a family, so defined The essence of the procedure is as follows. Suppose first that both husband and wife survive to the maximum duration of childbearing Thus, the family has survived at least as long as that duration, and its subsequent survival in each successive interval is the product of the probability of survival of at least one of the parents, and the probability of survival of at least one of the children The formula for the duration-specific probability of survival is $(1 - Q_{F1}Q_{MO})(1 - Q_{CH}^{N})$, where Q_{F1}, Q_{MO} and Q_{CH} are the respective individual survival probabilities of husband, wife and children, and N is the number of children alive at the beginning of the duration. Note that child survival requires not only remaining alive, but also remaining within the age span of children Should only one spouse survive the duration in question, the subsequent probability of family survival will be the product of the survival probability of the remaining spouse, and the child survival component as before The latter formulation also applies to the determination of the duration-specific probability of family survival in the situations in which either the husband or the wife has died before the end of the fertile period The results of this procedure are presented in table 9 For assistance in interpreting these results, the data in table 10 have been found to be helpful.

TABLE 9 LENGTH OF FAMILY LIFE

	Marriages surviving to end of fertile period		*Marriages dissolved before end of fertile period*		
	Proportion	*Mean*	*Proportion*	*Mean*	*Total Mean*
High equilibrium	0 31832	37 63	0 68168	24 48	28 67
Disequilibrium	0 75683	42 01	0 24317	33 87	40 03
Low equilibrium	0 95531	31 81	0 04469	30 09	31 75

TABLE 10 MEAN DURATION AND CHILD PARITY AT TIME OF TERMINATION OF WIFE'S FERTILITY

	Marriages surviving to end of fertile period		*Marriages dissolved before end of fertile period*	
	Mean duration	*Mean child parity*	*Mean duration*	*Mean child parity*
High equilibrium	25	2 75	11.63	2 10
Disequilibrium	25	4 89	13 92	3.71
Low equilibrium	20	2 07	11 70	1 61

39 In table 9 it is seen that the disequilibrium situation involves a substantially longer family lifetime than either of the equilibrium situations The determinants of the length of family life may be briefly indicated First in importance is mortality. The high level of adult mortality, in the high-equilibrium situation, forces premature termination of fertile life. That enhances the probability that the family will die, because one parent is less likely to survive than either of two parents, and it reduces the probability that at least one child will survive, by reducing the total number of children. Obviously, the high level of child mortality is prejudicial to long family life. The second determinant of length of family life is the level of fertility. The low equilibrium population has substantially higher survival probabilities than the disequilibrium population, on an individual basis, but the much higher child parity of the latter is a safeguard against termination of the family by child death High fertility is the principal source of the long family lifetime in the disequilibrium context The final determinant is the duration distribution of fertility. The mean duration of gross fertility is 10.5 in the high-equilibrium and disequilibrium situations, but 6 875 in the low-equilibrium model. This circumstance, in combination with low fertility, makes for a relatively short family lifetime in low equilibrium (The lower the mean duration of fertility, the lower the average age of the child at any duration, and therefore the shorter the interval until the child leaves home. Obviously, in the low-equilibrium context, child survival

is essentially 100 per cent, and the "deaths" of children are almost all a consequence of their arrival at marriage age.)

40. One by-product of the calculations just presented is table 11. The length of married life is the joint expectation of life of husband and wife subsequent to marriage. The meaning of this table is that for the last 9.47 years of its existence, the high-equilibrium family is headed by only one parent; that is almost one third of the family's total lifetime. Likewise, in the disequilibrium situation, although the length of married life has increased substantially, so has the length of family life, and the disequilibrium family is headed by only one parent for the last 4.19 years of its existence. Only with low equilibrium does one find a situation in which, partially because of improved survival, but mainly because of a smaller number of children born at an earlier duration, there is a considerable length of married life after the family, in the sense in which the term is used here, has gone out of existence. This is the so-called "empty nest" phase of the family life cycle. It is a unique characteristic of low equilibrium.

TABLE 11. LENGTH OF MARRIED LIFE AND LENGTH OF FAMILY LIFE

	Length of married life	*Length of family life*	*Difference*
High equilibrium	19.20	28.67	− 9.47
Disequilibrium	35.84	40.03	− 4.19
Low equilibrium	45.22	31.75	+ 13.47

41. Preliminary to the calculation of mean family size, of which the computation of length of family life is a prerequisite, an estimation has been made of the proportion of child life which is lost to family life because the children in question have been orphaned. This calculation requires a comparison of the total number of person-years of child life, with the number of person-years of child life within the family (the deficit being attributable to the deaths of both parents before the child reaches marriage age). The results are presented in table 12. These proportions indicate the amount by which the weighted total of person-years presented in table 3 must be discounted because of termination of the family prior to the sons and daughters reaching marriage age. Note that the proportions are lower for daughters than for sons, because daughters reach marriage age five years earlier than sons. The phenomenon of orphanhood is obviously an important characteristic of the high-equilibrium situation.

TABLE 12. PERCENTAGE OF CHILD LIFE LOST TO THE FAMILY BECAUSE OF ORPHANHOOD

	Sons	*Daughters*
High equilibrium ..	9.6	6.3
Disequilibrium	1.3	0.6
Low equilibrium	0.2	0.1

42. With these data in hand, it is possible to calculate the amount of family life contributed by each family member, here specifying that the person-years of survival for father and mother are, as a maximum, not the arbitrary 35 years used in table 3, but the actual length of family life as just determined. The person-years of survival of sons and daughters, from table 3, have been reduced by the orphanhood proportions in table 12. The results are presented in table 13, which shows the mean number in each category as well as the mean length of time each category spends in the family. The data of table 13 show the dual sense in which families have different sizes in the three models, and in different ways for different categories of family member. For fathers and mothers, the frequency category is obviously fixed; but the number of years is longer in the disequilibrium situation than in either equilibrium situation because larger numbers of children, born at a higher average duration, imply longer family life for the parents. For sons and daughters, the mean number of years of family life per child approaches a maximum (25 for sons and 20 for daughters) in the low-equilibrium situation, but the number of children is only one third of those in disequilibrium populations. The length of family life of sons and daughters is very low in the high-equilibrium situation because of high child mortality, exacerbated by orphanhood.

TABLE 13. LENGTH OF FAMILY LIFE OF FAMILY MEMBERS, AND, IN PARENTHESES, THEIR FREQUENCY

(Years)

	Father	*Mother*	*Sons*	*Daughters*
High equilibrium	20.98 (1)	22.17 (1)	11.00 (2.29)	10.02 (2.18)
Disequilibrium	34.54 (1)	36.26 (1)	21.46 (3.03)	17.75 (2.88)
Low equilibrium	30.28 (1)	30.77 (1)	24.25 (1.07)	19.62 (1.02)

43. Lastly, table 14 presents the measurement of mean family size. The key result is contained in the third column: it is the ratio of the first column to the second. The first column is the weighted sum of the values in table 13; the second column comes from

TABLE 14 MEAN FAMILY SIZE

	Total person years	*Length of family life*	*Mean family size*	*Mean numbers of parents*	*children*
High equilibrium	90 27	28 67	3 15	1.51	1 64
Disequilibrium	186 93	40 03	4 67	1 77	2 90
Low equilibrium	107 12	31.75	3 37	1.92	1 45

table 9 For purposes of discussion, mean family size is subdivided, in the last two columns, into mean numbers of parents and children.

44 The findings in table 14 will probably surprise those who infer from the coexistence of high fertility and low mortality that the disequilibrium context is one of large families While it is true that the value of 4 67 is large in relative terms, it scarcely seems so in absolute terms, especially when viewed from the perspective that the family, by definition, must have at least two members A large number of person-years is involved in the disequilibrium family, but those person-years are spread out over 40 years of time Nevertheless, mean family size is still 50 per cent larger than in the high-equilibrium context, almost entirely because of expansion of the child component Similarly, the chief contrast between disequilibrium and low equilibrium is that the average family in the latter has only one half as many children Once again, the "small-family system" epitomized by low equilibrium in fact yields a somewhat larger family size than does high equilibrium

45 Measures of family size, like any other measure, should be designed in different ways to serve different purposes It would appear from the literature that one of the most important facets of family size is the implicit magnitude of the dependency burden whenever there are many children In table 15, two calculations are shown which are relevant to that point.

TABLE 15 TWO MEASURES OF FAMILY DEPENDENCY

	Child/parent ratio	*Consumer/producer ratio*
High equilibrium	1 09	0 62
Disequilibrium	1 64	0.72
Low equilibrium	0 76	0 40

46 The child/parent ratio is derived from the last two columns of table 14 The consumer/producer ratio is calculated by subdividing child life into that part prior to age 15, during which the child is considered as a net consumer and allocated to the numerator of the ratio, and that part subsequent to age 15, during which the child is considered as a net producer and contributor to family income, and therefore allocated to the denominator of the ratio (along with the parents) The consumer/producer ratio provides a quite different perspective on the question of dependency from that suggested by the child/parent ratio Although the consumer/producer ratio is higher for disequilibrium than for high equilibrium, it is higher by only one sixth which scarcely seems a large enough increase to charac terize the disequilibrium family as overburdened by it

[illegible]

situation is too high, somewhat different assumption about relative marriage and remarriage patterns in hig equilibrium and disequilibrium, respectively, would reduce still further the relative rise in the consumer, producer ratio On the other hand, this calculation doe not consider the distribution of person-years in th numerator and denominator of the ratio, with respec to time In the period prior to the time the eldest chil turns 15, the consumer/producer ratio would reac very high levels in the disequilibrium family This i the kind of family population pressure which migh induce parents to terminate their childbearing at lower parity

47 A comparison of the two columns in table 1 indicates that, although there is a 50 per cent rise in th ratio of children to parents between the high-equilib rium and the disequilibrium situations, the increase i dependency, as measured by the ratio of consumers t producers, is only 16 per cent The small magnitude o the latter figure deserves further discussion because i appears to conflict with accepted wisdom about th consequences for dependency when mortality decline i unaccompanied by fertility decline The customar measure of dependency is the ratio of the populatio under age 15 and over age 65 to the remainder o the population Since this paper is not concerned wit the problem of old dependants, comments are restricte to the ratio of persons under 15 to those between 1 and 65 For the three populations implicit in the models the child-dependency ratio is 0 54 for high equilibriun and 0 85 for disequilibrium, an increase of 59 per cen

48 There are two important reasons for the dis crepancy between a 59 per cent rise in dependency as measured conventionally, and a 16 per cent rise, a measured in table 15. First, the denominator of th conventional ratio encompasses all persons between th ages of 15 and 65, whatever their family status, wherea the denominator used in the calculations of the con sumer/producer ratio in table 15 is limited to thos with the status of family member as defined above On implication of the lengthening of family life from 28 6 years in high equilibrium to 40 03 years in disequilib rium is an increase in the proportion of adult year (prior to age 65) which are allocated to the produce

side of the family budget. Secondly these micro-demographic models of family life exclude from consideration a most important aspect of the macro-demographic context, namely, the increase in the number of families which is implicit in a net reproduction rate of 2.51. The point is that, although the average value of the consumer/producer ratio in disequilibrium, over the entire 40 years of family life, is 0.72, the ratio is much higher than that in the time before the eldest child turns age 15. Since a rapidly growing population will have a disproportionately large number of families at early marital durations, the cross-sectional calculation, which is obviously the relevant one from the standpoint of the society as a whole, will show a higher burden of dependency than any one family would average over its lifetime.

49. From the standpoint of the individual family, the disequilibrium situation shows itself in two forms. On the one hand, the consumer/producer ratio of 0.72 over all is actually a balancing of a high dependency burden in the early years of the family against a low dependency burden in the later years. On the other hand, efforts to increase productivity and to compensate for the higher ratio of consumers to producers tend to be frustrated by the increased numbers of other families in the same situation.

Conclusion

50. The calculations presented in this paper provide a cogent explanation for the persistence of high fertility, despite a substantial decline in mortality. Comparison of the disequilibrium family with its precursor, the high-equilibrium family, is very much to the advantage of the former. The proportion of fathers without a male heir is reduced by one half, the length of joint married life increases from 19 to 36 years, each child lives almost twice as long within the family setting, the variability of each dimension of family life is reduced substantially, as is the pernicious role of chance. There are three times as many opportunities for parent/child interaction and four times as many for sibling interaction. The proportion of family life in which there is only one surviving parent is cut from one third to one tenth. Truly the high-equilibrium situation is "nasty; brutish and short", and its disequilibrium successor must seem like a boon by comparison.

51. The outstanding disadvantage of the disequilibrium family in the tables presented above is the consumer/producer ratio, which is 16 per cent higher than in the high-equilibrium situation. Taken at face value, such an increase might be regarded as an acceptable price to pay for the list of benefits enumerated in the preceding paragraph. But the qualifications to this observation are important. First, there is a substantial lag of producer-years behind consumer-years, and the source of borrowing is unclear. Secondly, the problems of the family in a disequilibrium population are exacerbated by the circumstance that the number of families competing with each other for a place within the socio-economic aggregate is increasing by 151 per cent per generation.

52. This is a prime example of the classic conflict between the perception of the situation from the micro-level, and the perception from the macro-level (which, in a methodological context, has been the prime purpose of this paper). But the point is far from academic, since the locus of the decision process, which will turn disequilibrium into low equilibrium by reducing fertility, is on the micro-level. There are points of particular strain within the disequilibrium situation, in particular, young adults prior to marriage and couples all of whose children are still young. Because of the correspondence between their micro-demographic perceptions, and the macro-demographic evaluation of the costs of rapid growth, these would appear to represent prime targets for policies and programmes.

53. Although the demographic exercises that constitute this paper have been illuminating to the writer, and may be instructive to others as well, they remain crude over-simplifications. The complexity of interpenetration of reproductive institutions and family population processes and structures lies well beyond the reach of mere deduction. This paper will have served its purpose if it provokes not merely an extension of simulations to encompass more elaborate contingencies, but the energetic pursuit of hard data concerning real families.

SOCIO-CULTURAL PATTERNS, FAMILY CYCLE AND FERTILITY *

Moni Nag **

BACKGROUND INFORMATION

"The structure and dynamics of the family are determined by births and in-movements, deaths and out-movements. This may seem demographic in process and therefore a statement of the demographic determination of family formation and dynamics; it is not The births and deaths that occur in the family group may be viewed with equal felicity as consequences of the rules that accord individuals to family units, the sex relations of the couples, and the extent to which decision-making and adaptation include the production of new life " [1]

1 Despite a wealth of published books and articles on the family, the mechanisms of the relationships between socio-cultural factors, the family processes and fertility have not been investigated adequately Anthropologists have studied kinship systems in depth, mostly in non-industrial societies, but have done very little in the way of relating such systems to fertility. Furthermore, there is rightful reluctance among anthropologists to distinguish too sharply between "family" and "kinship". [2] Sociologists have in the past focused more on the nuclear family than on wider kinship networks, largely because of the nature of the societies in which they worked Their work on fertility has for the most part connected individual socio-cultural factors with fertility outcomes, thus ignoring the family as mediator or individual family interaction processes with reproductive behaviour, thereby failing to provide an aggregate picture [3] For their part, demographers have concentrated on the end-products of such interaction —such as birth rates and migration—without relating these to family and kin Their interest has been mainly on the aggregates obtained from census and vital registration records, which usually take individuals as the unit The lines of distinction are, of course, blurring

Purpose and scope

2 This paper attempts to identify the important interrelationships between socio-cultural variables and family cycle, with special reference to fertility Attention is given to the beliefs and value systems, social organization, technological levels and other related factors, and their interrelationship with the formation, development and dissolution of the family Cases are drawn from the ethnographic, sociological and demographic literature covering international conditions and variations, both current and past

3. After setting down a working definition of "family" and briefly discussing ascribed functions of the family, this paper proceeds to make a case for the cyclical nature of the family. For the sake of organization, phases in the family cycle are considered in three broad categories. (1) marriage or union: family formation; (2) family development; and (3) divorce and death family dissolution

4 One is tempted to assume the biological model of a heterosexual couple reproducing, their offspring growing into adults and the parents dying In fact, it is known that the family is socially as well as biologically defined; and that fictive kin, in some societies, may be more important than actual biological kin Moreover, death can interrupt a family before it has completed the ideal biological cycle It is, therefore, acknowledged from the outset that the above-mentioned categories are by no means mutually exclusive: marriage may not signal the formation of another family if the newlyweds are to live in the extended family household where one of them has spent his or her childhood, likewise, the divorce of a young mother with a small child does not prevent the mother-child dyad from being called a family Clearly, there is no inevitable progression from one phase to the next, one may marry twice before having children, choose not to marry at all or in the married state remain childless

* The original text of this paper (E/CONF 60/SYM II/6) was submitted to the Symposium on Population and the Family, Honolulu, 6-15 August 1973

** [illegible] for [illegible] Anth [illegible]

[1] [illegible] tures [illegible] population and family interrelations ard priorities in research", in Arthur A Campbell and others eds, *The Family in Transition*, Fogarty International Center Proceedings No 3 (Bethesda, Maryland, National Institutes of Health, 1971), pp 46-47

[2] J R Goody, "The evolution of the family", in Peter Laslett and Rich[illegible] *Past Time* (London, [illegible] 20

[3] Reuben Hill [illegible] *The Family and Po*[illegible] Yale University Press, 1959) For illustrations see J Mayone Stycos, "Experimentos sobre cambios sociales Los estudios de fecundidad en el Caribe", in Joseph A Kahl, ed, *La industrialización en América Latina* (Mexico, 1965), pp 54 66, Reuben Hill, "'La familia' en la planificación familiar", paper presented at the workshop, "Como mejorar programas de planificación familiar en América Latina", Bogotá Colombia, 24 May-4 June, 1971.

5. Despite these and other limitations, the general concept of family cycle is, none the less, extremely important because it leads one away from thinking in terms of static ideal family types and towards an appreciation of actual process. This paper discusses particular socio-cultural variables in terms of the phases of the family cycle for which they appear most relevant. In other words, the paper is topically organized around family-cycle variables, and socio-cultural variables are discussed only in connexion with these. Of course, the family is very much part of its socio-cultural setting, in fact, difficult to untangle from it. The interaction is, therefore, much more complex than would appear from the heuristic organization of materials that follows. Furthermore, both socio-cultural and family-cycle variables are subject to external political, economic and demographic constraints, which are, for the most part, outside the scope of this paper. Consequences for reproduction are also discussed in terms of phases in the family cycle.

Definition of family

6. The term "family" is employed here with full recognition of the controversy surrounding the question of its universality as well as of the existence of other terms, such as "household" and "domestic group", which have been distinguished from it.[4] Family is used here in accord with Taeuber's definition as, "Those related persons who live together within a household, usually with common eating as the criterion of co-living".[5] This definition has limitations. For example, one author has stated, "The family is not merely a residential group or a household, it is a system of relationships, rights and duties and the norms that the members try to live up to".[6] While kin interaction can hardly be dealt with in the mass collection of census or survey data, its importance should not be overlooked in the design of community studies.

7. The term "domestic group" has been used by some anthropologists in discussing the way in which the development cycle influences family and household. It is an over-all term for three main kinds of units, namely, the dwelling unit, the reproductive unit and the economic unit. The economic unit may cover persons engaged in the process of consumption. In some development cycles, they are quite distinct.[7] Although the concept of domestic group introduces an element of flexibility in some kinds of analysis, it is extremely difficult to use it for the purpose of this paper.

Role and function of the family

8. In what is perhaps the classic anthropological treatise on the subject, the claim is made that "the nuclear family is always recognizable and always has its distinctive and vital functions—sexual, economic, reproductive, and educational".[8] A distinguished sociologist has also defended the universality of the nuclear family, based on the two functions: socialization of children; and the socio-psychological integration achieved in the balancing of personalities in the conjugal relationship.[9] Examination of the ethnographic literature provides significant exceptions to these generalizations.

9. Among the Masai and Chagga of East Africa, for young men the sexual function is not limited to the family unit; since their function as warriors precludes marriage for that period of their lives, they are permitted promiscuous relations with young women.[10] A review of the literature on Caribbean families makes it obvious that, despite the persistence of the ideal of the nuclear family, the prevalence of other family types is as high as 40 per cent.[11] The woman-headed household, among Guiana Negroes and the Black Carib, diminishes the force of the functional argument for the nuclear family based on the husband's economic participation in the household and the psychologically important function of the shared conjugal relationship. Unmarried sisters and their children often can be found living in the same household with their brothers and mother and receiving male visitors for sexual relations. It has, therefore, been suggested that elemental familial relations are dyadic rather than based on the nuclear family.[12]

[4] Most authors view the household and domestic group as synonymous, although important exception has been taken to this. See J. R. Goody, *loc. cit.*, p. 106. According to the definition recommended as an international standard, "a household consists of a group of individuals who share living quarters and their principal meals". See *Multilingual Demographic Dictionary, Population Studies*, No. 29 (United Nations publication, Sales No. 58.XIII.4), p. 4. For complexity involved in the definition of household, see Valdecir Freyre López, "El estudio de la familia con base en los censos de población", in *Conferencia Regional Latinoamericana de Población*, Proceedings of the Conference, held at Mexico City, August 1970 (Mexico, 1972), vol. 1, p. 269.

[5] I. B. Taeuber, "Change and transition in family structures", *loc. cit.* p. 41. It is different from the following definition stated in the *Multilingual Demographic Dictionary*: "The family is a different unit which must be carefully distinguished from the household. It is defined primarily by reference to relationships which pertain to or arise from reproductive processes and which are regulated by law or by custom.", p. 5.

[6] I. P. Desai, "Family research in South East Asia—an approach (with special reference to India)", in Family Planning Association of India, ed., *Changing Family Patterns of Asia*, report of the Proceedings of the XVII International Conference on the Family, held at New Delhi, 11-17 December 1966 (Bombay, 1966), pp. 196-199.

[7] J. R. Goody, *loc. cit.*, p. 106; Meyer Fortes, "Introduction", in J. R. Goody, ed., *The Development Cycle in Domestic Groups* (London, Cambridge University Press, 1966).

[8] G. P. Murdock, *Social Structure* (New York, Macmillan, 1949), p. 3.

[9] T. Parsons, "The American family: its relations to personality and to the social structure", in T. Parsons and R. F. Bales, eds., *Family Socialization and Interaction Process* (Glencoe, Illinois, Free Press, 1955).

[10] Claude Levi-Strauss, "The family", in John Middleton, ed., *Studies in Social and Cultural Anthropology*, 2nd ed., (New York, Thomas Y. Crowell, 1968), p. 131; originally published in Harry L. Shapiro, ed., *Man, Culture and Society* (New York, Oxford University Press, 1956).

[11] Nancie L. Solien Gonzalez, *Black Carib Household Structures* (Seattle, Washington, 1969).

[12] R. N. Adams, "An inquiry into 'the nature of the family'", in G. E. Dole and R. L. Carneiro, eds., *Essays in the Science of Culture, in Memory of Leslie A. White, in Celebration of his 60th Birthday and his 30th Year of Teaching at the University of Michigan* (New York, Thomas Y. Crowell, 1960), p. 36.

10 In other societies, although the biological nuclear family could be found to reside together, it did so in the context of a larger extended family, and could only be artificially separated from this larger grouping, to be identified as being primarily responsible for the socialization of children [13] Elsewhere, the responsibility for socialization varies with the age of the child, among the Ashanti, the child is socialized at one point by a consanguineal unit comprised of its mother and her brother, and at another point by the conjugal unit of its mother and father. [14]

11. In modern industrial societies, few parents would think of formally educating their children The schools, television and peers have taken over much of this function The modern shift of functions from the family to other specialized social agencies has important consequences for reproductive behaviour [15]

12 The case against universal functions of nuclear or other types of family should by no means diminish the basic proposition that in every society the family serves significant—if varying—social requisites It is widely maintained that the family is the basic social unit, and one popular anthropologist has gone so far as to state that, despite recurrent talk of troubled times for the family in periods of revolutionary change, "It is the only institution we have that doesn't have a hope of disappearing" [16] In evolutionary terms, the family served as the mechanism to ensure survival of the young so that they might live to reproduce and maintain the human species The offspring of primates are born helpless and require both nurture and protection; the co-operation of females nursing and caring for children and males defending females and their children from predators evolved out of necessity [17] Today, it appears that some social institutions which were designed in large part to ensure reproduction and ward against high mortality by protecting and providing for the rearing of children, are already changing or need changes to allow the societies to adapt themselves to their environments

Feedback mechanisms

13 Although the decision to procreate can be made outside of the settings of marriage and the family, for the most part, societies exercise control over reproduction through these institutions. The line of causation is not simply one-way, with socio-cultural conditions determining family formation and dissolution, and these family processes in turn influencing reproduction. Social scientists have become increasingly aware of how demographic mechanisms can limit social forms [18] Still, the limitation of possibilities should not be confused with "demographic determinism", the timing and number of births are themselves very much a function of role prescriptions; economic considerations, such as the perceived costs and benefits of children, religious mores; rules of descent inheritance and so on

14 In actuality, feedback mechanisms among family, socio-cultural variables and fertility operate in a complex manner For instance, new attitudes of equality for women affect the availability and desirability of alternatives to marriage, which, in turn, may affect reproductive behaviour Within marriage, communication patterns between husbands and wives, parents and children, and between in-laws are also likely to be modified if females become more independent If fertility is lowered as a result, then the future age distribution of the population will change as well A new demographic profile, together with modified family size, means different intra-family roles, a changing pool in the proportion of potential marriage partners and an altered job market In other words, changes in any of the socio-cultural, familial or demographic variables can have repercussions for others

15 The importance attached to each of the variables can also change with time Whereas high fertility in the absence of birth control and high mortality in the absence of medical care may have once played the major part in determining population profiles, today new roles and ambitions may be the more significant factors determining population growth Of course, to suppose that families act and react in a fashion automatically synchronized with changes in the social and demographic scene would be to misread reality Time lags, even lasting generations, between the occurrence of such social changes and responses in terms of modified reproductive behaviour may frequently result from the persistence of high fertility norms long after economic reality would proscribe them. [19]

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[13] M J Levy and L A Fallers, "The family, some com- [illegible]

[15] Ronald Freedman, "Norms for family size in underdeveloped areas", in Charles B Nam, ed, *Population and Society a Text-book of Readings* (Boston, Houghton Mifflin, 1968), pp 223-224, originally published in *Proceedings of the Royal Society* (United Kingdom), vol 159 (1963), pp 220-234

[16] Margaret Mead, "The future of the family", *Barnard Alumni Magazine* (New York), 1971 See also R. Konig, "Familie und Familiensoziologie", in W Bernsdorf and F Bulow, eds, *Worterbuch der Soziologie* (Stuttgart, 1955), p 126

[17] Kathleen Gough, "The origin of the family", in Morton H Fried, ed, *Explorations in Anthropology, Readings in Culture, Man, and Nature* (New York, 1973), p 302; originally published in *Journal of Marriage and the Family* (United States of America), vol 33, No 4 (1971), pp 760-771

[18] See Peter Laslett, "Introduction the history of the family", in Peter Laslett and Richard Wall, eds, *Household and Family in Past Time* (London, Cambridge University Press, 1972), p 58 The same point is made by Godelier, who regards interdisciplinary co-operation among the social [illegible]

Arthur A Campbell and others, eds, *The Family in Transition*, Fogarty International Center Proceedings No 3 (Baltimore, Maryland, National Institutes of Health, 1971), p 23

16. The family, thus seen, is not merely a passive filter through which changes in population are wrought by socio-cultural variables. As the locus where decisions about reproduction are made, it can be viewed as more a "force of change than an adaptive institution", as a nexus whose members are "not merely spectators but actors".[20] The family "acts" in its effects upon demographic variables, just as changes in these can modify its size, composition and interaction; likewise, altered socio-economic opportunities affect stages of child dependency, marriage rates, migration and so on.

17. Intra-familial communication as a key to decisions about reproduction should be further investigated. Many questions come to mind: whether it is true that modernization is dependent upon delayed marriages and birth control, as has been suggested;[21] the way in which the speed of the demographic transition affects social change;[22] and determination of the thresholds below which consumption desires compete with family size.[23] All of these areas have received some attention in the literature, but thus far there has been a failure to integrate the knowledge or to provide an operational basis for predicting future trends.[24]

Marriage union: family formation

18. Marriage is a major cultural mechanism to ensure the formation, development and continuity of family.[25] It should be distinguished from casual mating or union of man and woman entered into primarily for the purpose of sexual gratification. Although marriage in all societies provides a legitimate means of sexual gratification, it has other and more important social functions similar to those of family. Levi-Strauss[26] has gone to the extent of stating that "among most people, marriage has very little to do with the satisfaction of the sexual urge, since the social set-up provides for many opportunities which can be not only external to marriage, but even contradictory to it". According to him, two fundamental functions of marriage, at least in societies with primitive technology, are: (1) sexual division of labour originating more from social and cultural than from biological considerations; (2) establishment of mutual dependency between families through the prohibition of incestuous marriages.

Definitions, types and forms

19. Although marriage is a well-defined and legally recognized institution in many societies, it is extremely difficult to formulate a definition which would apply to all the institutions commonly referred to as marriage by ethnographers. In *Notes and Queries in Anthropology*, a standard reference book, the following definition was given in 1951: "Marriage is a union between a man and a woman such that children born to the woman are recognized legitimate offspring of both parents".[27] Several limitations of this definition have been subsequently pointed out. It has been argued that the woman-marriage-to-a-woman among the Nuer of Africa has legal provisions strictly comparable to those of simple marriage between a man and a woman.[28]

20. The criterion of legitimacy of offspring in the above-quoted definition of marriage has generated a stimulating controversy among the anthropologists in the past two decades, and quite a bit of it is centred around the Nayar caste of south-west India—a borderline case for theorists of kinship. As a result, reference to the Nayar family and marriage, as they existed in the eighteenth century prior to the British occupation of the area, is very common in the textbooks on kinship or cultural anthropology. A brief description of the Nayar case would be helpful in illustrating the wide range of possible variations in human societies concerning the topics of main concern in this paper.[29]

21. The Nayar caste was divided mainly into four ranked subdivisions characterized by different political functions. The following description relates primarily to the lowest subdivision, which consisted of several sub-

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[20] Hermann Schubnell, "Interrelations between the development and structure of the population and development and structure of families", in Family Planning Association of India, ed., *Changing Family Patterns in Asia*, report of the Proceedings of the XVII International Conference on the Family, New Delhi, 11-17 December 1966 (Bombay, 1966), p. 41.

[21] I. B. Taeuber, "Change and transition in family structures", *loc. cit.*, p. 87.

[22] Edward Pohlman, "The timing of first births: a review of effects", *Eugenics Quarterly* (United States of America), vol. 15, No. 4 (1968), p. 253. See also Pablo Marangoni S. and Francisco Parra Gil, "El problema poblacional con relación al desarrollo en América Latina y Ecuador", *Revista Ecuatoriana de Higiene y Medicina Tropical*, vol. 23 (1966), pp. 195-207; Victor Urquidi. "El desarrollo económico y el crecimiento de la población", *Demografía y Economía* (Mexico), vol. 3 (1969), pp. 94-103.

[23] J. Clyde Mitchell, "Cultural explanations of fertility differences", *Journal of Biosocial Science* (United Kingdom), vol. 3 (1971), p. 60. See also Jacques Lambert, "El crecimiento de la población Brasileña," in Joseph A. Kahl, ed., *La Industrialización en América Latina* (Mexico, 1965), pp. 28-29.

[24] Arthur A. Campbell, "Changing patterns of childbearing in the United States", in Arthur A. Campbell and others, eds., *The Family in Transition*, Fogarty International Center Proceedings No. 3 (Bethesda, Maryland, National Institutes of Health, 1971), pp. 175-185.

[25] In societies emphasizing solidarity of lineal kin-groups over marital solidarity and extended family systems, family formation is scarcely a meaningful concept. But in other societies, a family is usually formed through marriage or parenthood. In most societies, it is thought proper that marriage should precede pregnancy. See Robert F. Winch, "Family formation", in David Sills, ed., *International Encyclopedia of Social Sciences* (New York, Macmillan, 1968), vol. V, p. 1.

[26] C. Levi-Strauss, *loc. cit.*, pp. 143-146.

[27] British Association for the Advancement of Science, *Notes and Queries in Anthropology* (London, 1951), p. 110. This definition represented the view of many eminent scholars, including Westermarck, Malinowski and Radcliffe-Brown, that marriage is closely linked to parenthood.

[28] Edward Evan Evans-Pritchard, *Kinship and Marriage among the Nuer* (London, Oxford University Press, 1951), pp. 108-109. See also Kathleen Gough, "The Nayars and the definition of marriage", in Nelson Graburn, ed., *Readings in Kinship and Social Structure* (New York, Harper and Row, 1971), p. 365; originally published in the *Journal of the Royal Anthropological Institute* (United Kingdom), vol. 89 (1959), pp. 23-24.

[29] The description has been abstracted mainly from Kathleen Gough, "The Nayars and the definition of marriage", *loc. cit.*, pp. 365-377.

castes of commoner Nayars Each village had from four to seven exogamous matrilineages of a single subcaste. Men of these subcastes were trained as professional soldiers and usually were absent from the village for part of each year in connexion with military activities Only the matrilineal property-owning units (*Karanavan*) consisting of woman and children remained in their ancestral homes. One characteristic feature of the Nayar kinship system was that each lineage was linked by hereditary ceremonial ties with two or three other lineages. Every few years each lineage held a ceremony at which all pre-puberty girls, aged from seven to 12, were ritually married to men belonging to its linked lineages After this ritual marriage (*tálikettukalyánam*), each couple was secluded in private for three days during which sexual relations might or might not take place The ritual husbands then left the house and had no further obligations to their ritual wives A ritual wife also had no further obligation to her husband, except one which was very important· at his death she and all her children (whoever might be their genitor) had to observe a death-pollution ceremony for him The ritual marriage was essential for a girl and marked various changes in her social position. The most important among them, perhaps, was that as she grew old enough she received as visiting husbands a number of men belonging to her subcaste or higher subcaste/caste This kind of visiting relationship (*sambandham*) was strictly forbidden between any Nayar woman and a man belonging to a subcaste/caste lower than hers The ritual husband might have casual or regular sexual relationships with his ritual wife, if both parties were willing A woman was free to receive casual visitors of appropriate subcaste/caste and accept a small cash gift at each visit. But a more regular visitor had certain customary obligations, which included the offering of various gifts during festivals When a woman became pregnant, it was essential for one or more men of appropriate subcaste/caste to acknowledge probable paternity by providing a fee to the midwife. If no such man would do so, she would be either expelled from her lineage and caste or even killed by her matrilineal kinsmen The child born out of such union could not be accepted as a member of his/her lineage and caste. The biological fatherhood of a child was often uncertain It was presumed to lie with the man or among the men who had paid the delivery fee Even when it was known with certainty, the genitor had no economic, social or ritual obligations to or rights in the child The guardianship and care of all children were vested entirely in the matrilineal kinsmen of the property-owning unit to which their mother belonged

22 The Nayar case has been cited by anthropologists in order to argue both against and for the use of legal paternity as a universal criterion of marriage Leach[30] points out that a Nayar child uses a term of address meaning "lord" or "leader" towards all its mother's lovers, but the use of this term does not carry with it any connotation of paternity, either legal or biological. Hence, according to him, the notion of fatherhood is lacking among the Nayar, although certain elements of a normal marriage institution are present He does not think it possible to find a universal definition of marriage, but the institutions commonly classed as marriage are concerned with the allocation of a number of distinguishable classes of rights

23. Gough, an anthropologist well-known for her investigations among the Nayar, disagrees with Leach and regards the Nayar unions as marriage mainly because the concept of legally established paternity was of fundamental significance in establishing a child as a member of his lineage and subcaste/caste She thinks that for purposes of cross-cultural comparison a single, parsimonious definition is necessary and suggests the following· "Marriage is a relationship between a woman and one or more other persons, which provides that a child born to the woman under circumstances not prohibited by the rules of the relationship, is accorded full birth-status rights common to normal members of his society or social stratum "[31]

[illegible]

riage. But there are societies in which such rights accrue to persons born of relationships which are not recognized as marriage according to prevailing legal or customary rules [32] If Gough intends to give some special legal significance to the term "full" in "full birth-status rights", her implications may be valid for most societies But in Caribbean and some other societies the children born out of casual visiting unions which are not recognized as marriage from legal or customary points of view do have full social recognition

25 Several types of union can be distinguished in these societies, depending mainly upon the stability,

[30] E R Leach, "Polyandry, inheritance and the definition of marriage", in J R Goody, ed , *Kinship* (Baltimore, Maryland, 1971), pp 153-154, originally published in *Man*, vol 55 (1955), pp 185 186 Leach provides a few examples of types of rights which marriage may serve in different societies, including the following (*a*) to establish the legal father of a woman's children or the legal mother of a man's children, (*b*) to give husband/wife right in the spouse's sexuality, (*c*) to give husband/wife partial or monopolistic right over spouse's labor services or property None of these rights, according to Leach, is invariably established by marriage in every known society Perhaps in a similar vein, the *Multilingual*

[illegible]

natives But this definition appears tautological

living arrangement of the partners and customary/legal recognition of the union. The most commonly used terms for the three main types of union, particularly in the relevant literature for Caribbean societies, are: (*a*) visiting; (*b*) common-law; and (*c*) legal.[33] The legal union is sometimes referred to simply as "marriage" and common-law union is sometimes referred to as "common-law marriage". The terms "consensual" or "customary" are often used with the same implications as "common-law".[34]

26. Although monogamy is the form of marriage practised by most couples in almost all societies of the world, a cross-cultural discussion of marriage and family should include two other forms of marriage, namely polygyny and polyandry, which are often linked under the single term "polygamy". Even when polygyny or polyandry is permissible or approved in a society, it cannot be practised by a large proportion of men and women due to the following reasons, among others: (*a*) a large disparity in sex-ratio is rare; (*b*) a large number of marriageable men or women may have to remain unmarried or celibate and may become a source of social disorganization.

27. The task of categorizing a society as monogamous, polygynous or polyandrous is beset with several problems. Two of them are: a discrepancy between ideal/approved/permissible and actual practice; and the difficulty in setting up quantitative criteria concerning the incidence and intensity of polygyny and polyandry.[35]

[33] See, for example, G. W. Roberts and L. Braithwaite, "Fertility differentials by family type in Trinidad", *Annals of the New York Academy of Sciences*, vol. 84, No. 61 (1960), pp. 963-980; G. T. M. Cummins, H. G. Lovel and K. L. Standard, "Population control in Barbados", *American Journal of Public Health*, vol. 55 (1965); Judith Blake, *Family structure in Jamaica* (Glencoe, Illinois, The Free Press, 1961), pp. 249-250; Henri Léridon, "Les facteurs de la fécondité en Martinique", *Population* (France), vol. 26 (1971), pp. 277-299; Moni Nag, "Patterns of mating behaviour, emigration and contraceptives as factors affecting human fertility in Barbados", *Social and Economic Studies* (Jamaica, West Indies), vol. 20, No. 2 (1971), pp. 111-133; which appeared in Spanish as "Comportamiento conyugal, migración y anticoncepción que afectan a la fecundidad humana en Barbados", in *Conferencia Regional Latinoamericana de Población*, Proceedings of the Conference held at Mexico City, August 1970 (México, 1972), vol. 1, pp. 379-386. In the same volume, see Walter Mertens, "Investigación sobre le fecundidad y la planificación familiar en América Latina", pp. 200-202.

[34] See, for example, *Multilingual Demographic Dictionary*, p. 9; Robert Winch, *loc. cit.*, p. 2; Centro Latinoamericano de Demografía, "Reunión de trabajo sobre evaluación de programas de planificación familiar" (Santiago, Chile, 1970), p. 7.

[35] In an attempt to study the relationship between polygyny and fertility, Nag categorized a society as high on the scale of the incidence of polygyny if 20 per cent or a higher proportion of all married women were polygynously married at the time of investigation. Murdock also used the 20 per cent limit for differentiating the degrees of incidence of polygyny, but it is not clear whether he meant the same thing. See G. P. Murdock, "World ethnographic sample", *American Anthropologist*, vol. 59 (1957), p. 670; Moni Nag, *Factors Affecting Human Fertility in Nonindustrial Societies: A Cross-Cultural Study*, Yale University Publications in Anthropology, No. 66 (New Haven, Conn., Yale University Press, 1962), pp. 93-94.

Age at marriage

28. There are individual and group variations in the ages at which women and men attain their capacity to reproduce, but these variations are much less limited in range compared with those in the norms and averages of age at marriage of women and men in human societies. These norms and averages are related to a multitude of socio-cultural variations and there are evidences of considerable changes in the same society over a period of time.

29. The difficulties involved in the definition of marriage, stated above, apply equally to the definition of age at marriage. In some societies, for example, in India, a girl and a boy may go through a marriage ceremony much before their puberty, but the girl may continue to live in her parental home without having any sexual relations with her husband until she reaches puberty. On the other hand, in a Caribbean society, a young couple may begin having a sexual relationship and also children at an early age, but may not go through the marriage ceremony until much later. For the sake of brevity and simplicity, the following discussion is confined to age at first marriage only and mainly to monogamous societies which have sanctions against reproduction prior to a formally recognized marriage.

30. Probably marriage and kinship are fields in which anthropologists have contributed their best, but age at marriage is one of the topics they have talked about least. This gap may be because of the following characteristic features, among others, of the societies they have primarily studied so far: (*a*) difficulty in the determination of age; (*b*) recognition of marriage as a gradual process rather than as an event recognized formally; (*c*) generally early marriage of women, around the period they attain menarche. If the age at marriage of women is found to be delayed considerably in a society, anthropologists have sometimes discussed it.[36]

Variations in space and time

31. There are very few countries in the contemporary world that have adequate data for calculating directly the average age of women and men at marriage. It can, however, be estimated from the census data concerning marital status by age groups. One such measure devised by Hajnal[37] is known as "singulate

[36] For example, among the people of Tikopia, a small island in the British Solomon Islands, marriage for both men and women is regarded as an honorable state, but they "tend to marry rather late, that is, in their early or middle twenties". Raymond Firth, "Family in Tikopia", in M. F. Nimkoff, ed., *Comparative Family Systems* (Boston, Mass., Houghton Mifflin, 1965), p. 107. In the study of an Irish village, one of the earliest studies of a peasant community by anthropologists, the authors discuss the socio-economic factors leading to delayed marriage and non-marriage among them. See C. M. Arensberg and S. T. Kimball, *Family and Community in Ireland* (Cambridge, Mass., Harvard University Press, 1940), chaps. 6-8.

[37] John Hajnal, "Age at marriage and proportions marrying", *Population Studies* (United Kingdom), vol. 7 (1953), pp. 111-136.

mean age at marriage". Dixon[38] has found reasonably good data for 57 countries in their respective censuses undertaken around 1960, from which she has computed this measure The singulate mean ages at marriage for the five regions in which she groups these countries are presented below in summary form·

Region	Number of societies in region	Mean age at marriage	
		Women	Men
Middle East	11	19 6	24 9
Asia	14	20 9	25.1
Eastern Europe	8	21 6	25 1
English-speaking overseas	4	21 4	24 6
Western Europe	20	23 2	26 2

SOURCE Ruth B Dixon, "Explaining cross-cultural variations in age at marriage and proportions never marrying", *Population Studies* (United Kingdom), vol 25, No 2 (1971), pp 215-233

32. It is obvious from this table that around 1960 the western European region had the highest average age at marriage for both women and men Individual country variation is naturally much greater than regional variation For example, the singulate mean age of women at marriage is 16.8 years for India and 25 5 years for Ireland, and the corresponding figures for men are 21.8 and 28 5, respectively. The means for men are higher in all countries, with an age gap ranging from two years in Yugoslavia to nine years in the Libyan Arab Republic. The gaps are larger in Asia and the Middle East than in other regions

33. Recent studies in historical demography have demonstrated that there were considerable changes in the age gaps between grooms and brides in a few European countries In Colyton, grooms and brides were of the same average age in the sixteenth century; there then followed a period when brides were normally older than their grooms and then came a period when grooms were normally older than their brides [39]

34 Although Hajnal gave some evidence of a "non-European" pattern of early and universal marriage in western Europe of the Middle Ages, other evidences indicate a high average age at marriage and a high proportion of non-married women in parts of Europe at least as early as the sixteenth century and perhaps even in the fourteenth century.[40] In recent years, however, there is a trend among couples in many European countries and in the English-speaking countries overseas towards earlier marriage and a trend among some non-European countries towards delayed marriage.[41]

Socio-cultural correlates

35. There are evidences from recent studies in historical demography of a few European societies to support Coale's contention that the control of age at marriage and proportions marrying was the clearest response to changing economic conditions before and during the early stages of demographic transition in these societies But this control was found to diminish as the availability and efficiency of contraception methods increased [42] The importance of economic indicators is also demonstrated in explaining the variation in the singulate mean age at marriage in contemporary countries But it is truer for western countries than others The youths in wealthier western countries have been marrying earlier, particularly since the end of the Second World War, as the financial constraints on early marriages are being lessened The most important factor, however, in explaining the variability in singulate mean age at marriage of women is that it is generally higher in societies with a higher proportion of literate teen-age girls [43]

36 The early age at marriage in the traditional Asian agrarian societies is related to the characteristic features of their social structure, religious beliefs and value systems The ideal of patrilocal extended families and the importance of corporate patrilineal kin-groups, such as lineage and clans, have been considered two such important features [44] The dependence of the newly married couple on these kinship institutions minimizes the necessity of their economic self-sufficiency prior to marriage in many western societies, even in the pre-industrial period The custom of impartible inheritance (e g , primogeniture or ultimogeniture) and the notion of independence of the nuclear family in many pre-industrial agrarian societies have contributed to delayed marriage among them [45] It is, however, extremely difficult to validate these associations by statistical tests

37. According to Hindu religious beliefs, only a son can perform certain of the religious rites after the death

[38] Ruth B Dixon, "Explaining cross-cultural variations in age at marriage and proportions never marrying", *Population Studies* (United Kingdom), vol 25, No 2 (1971), pp 216-218 India and Ireland represent the two extremes among the 57 countries analysed by Dixon

[39] E A Wrigley, *Population and History* (New York, McGraw-Hill, 1969), p 105

[40] J Hajnal, "European marriage patterns in perspective", in D V Glass and D E C Eversley, eds, *Population in History Essays in Historical Demography* (London, 1965), pp 101-143; E A Wrigley, *op cit*, p 90 The present paper does not deal with the quantity of marriage or non-marriage because of lack of space It is, however, correlated highly with the age at marriage (R B Dixon, *loc. cit*) except for some societies in which religion, such as Catholicism or Buddhism, encourages persons to remain non-married for the whole or part of their life

[41] R B Dixon, *loc cit*, p 216

[42] A J Coale, "Factors associated with the development of low fertility an historic summary", in *Proceedings of the World Population Conference, 1965*, vol II, *Fertility, Family Planning, Mortality*, pp 205-209, Geoffrey Hawthorn, *The Society of Fertility* (London, 1970), p 88

[43] R B Dixon, *loc cit*, p 225

[44] Frank Lorimer, "General theory", in Frank Lorimer and others eds, *Culture and Human Fertility* (New York, Columbia University Press, 1955), pp 156-159, Kingsley Da[illegible] and J[illegible]dith Blake "Soc[illegible]al str[illegible]ct[illegible]re and human fertility [illegible]

and Judith Blake, eds, *Factores sociologicos de la fecundidad* (Mexico, 1967), pp 158 159

[45] Kingsley Davis and Judith Blake, *loc cit*,

of his father. The father is doomed to a particular kind of hell unless these rites are performed. The word for son in Sanskrit is *putra,* which literally means one who saves from *put*, the hell.[46] This belief still holds for many contemporary Hindus and encourages early marriage for men since a son can be begotten only through marriage.

38. In kinship-oriented societies, marriage is usually arranged by older kin who are eager to marry off their girls quite early for the following reasons, among others: (*a*) early marriage assures maximization of procreation and helps to remove the stigma of barrenness; (*b*) younger girls are sexually more attractive and, therefore, bring a higher bride price or need a lower dowry; (*c*) loss of virginity or pre-marital pregnancy on the part of an unmarried girl may bring disgrace upon the family and the whole descent group, or may be considered sinful; (*d*) marrying off children may be a religious duty, and a source of honour and prestige on the part of the parents; (*e*) addition of a daughter-in-law to the family may be viewed as an economic advantage, since her services replace those of daughters who leave in marriage.[47] Davis-Blake, however, thinks that there is no empirical evidence to demonstrate that parental control over the selection of marital partners has been primarily associated with very early marriage. She presents some interesting reasons and illustrations to support her view that "social changes that release parents from intense moral obligation to marry off their children will allow the older generation to use its control to prevent early marriage despite favourable conditions encouraging it."[48] But it is difficult to identify such social changes which will make the parents want to marry off their children at a delayed age, as well as allow them to retain their control over it, except for a very short transitional phase of socio-economic development.

39. Age at marriage is related to the welfare of women, from both the physical and the social points of view. The consensus of medical opinion is that the chances of miscarriage or still birth increase with increasing age of women at marriage.[49] But there are evidences to support the view that these chances are quite high in pregnancies occurring at a very early age, and that at a later age, the reproductive organs of a woman who has had a miscarriage or still birth at an early age are likely to be damaged. As a consequence, she may become relatively infecund.[50]

40. The social advantage of a delayed age at marriage of women is often pointed out in terms of the time this delay allows them to develop their own abilities and shape their own ambitions. It may make them more selective with respect to whom they wish to marry, thus leading to a more satisfactory life, whether married or not.[51] Many early marriages in western societies result from pre-marital conceptions. Presser[52] points out that the postponement of early motherhood and hence of early marriage in these societies could lead to greater marital stability and greater diversity of life-styles for women. The United Nations has declared that child marriage and betrothal of young girls before puberty should be prohibited. The range of legal minimum ages for the marriage of women lies between 12 and 20 years across countries, while actual averages are somewhat higher. Dixon[53] has shown that in most countries the average age at first marriage of women tends to be higher among educated and employed women and higher in urban than rural areas.

Age at marriage and fertility

41. If contraceptives and other birth-control methods are used widely and effectively in a society, the age at marriage is not expected to have any direct significant effect on its fertility level. Undoubtedly, however, it is one of the most important among the 11 "intermediate" variables identified by Davis and Blake,[54] through which, and only through which, fertility level can be affected, particularly in a non-contraceptive situation. Unfortunately, neither the fertility data nor the data regarding age at marriage are available for a sufficient number of non-contraceptive societies so that a satisfactory statistical analysis can be made to determine the significance of their association. A cross-cultural study[55] of 48 non-industrial societies, which were rated as "high" and "low" in terms of some quantitative criteria concerning fertility level and age

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[46] Moni Nag, *Factors Affecting Human Fertility in Non-industrial Societies*, p. 60.

[47] *Ibid.*, p. 92; Frank Lorimer, loc. cit., p. 158; Judith Davis-Blake, "Parental control, delayed marriage and population policy", in *Proceedings of the World Population Conference, 1965*, vol. II, *Fertility, Family Planning, Mortality*, p. 133.

[48] J. Davis-Blake, *loc. cit.*, pp. 131-136.

[49] James H. Leathem, "The effects of aging on reproduction", in Joseph Thomas Belardo, ed., *The Endocrinology of Reproduction* (New York, 1958), p. 320.

[50] Robert R. Kuczynski, "South African Commission Territories, East Africa, Mauritius, Seychelles", in *Demographic Survey of the British Colonial Empire*, vol. 2 (London, 1949), pp. 612 and 871; M. F. Ashley Montagu, *Adolescent Sterility* (Springfield, Illinois, Charles C. Thomas, 1946), pp. 90 and 121; A. J. Coale and C. Y. Tye, "The significance of age-patterns of fertility in high fertility populations", *Milbank Memorial Fund Quarterly*, vol. 39 (1961), p. 262.

[51] Suzanne Keller, "The future status of women in America in demographic and social aspects of population growth", in Charles F. Westoff and Robert Parke, eds., *The Commission on Population Growth and the American Future Research Report*, vol. I (Washington, D.C., 1972), p. 272.

[52] Harriet B. Presser, "Perfect fertility control: consequences for women and the family", in Charles F. Westoff and others, *Towards the End of Growth: Population in America* (Englewood Cliffs, New Jersey, Prentice-Hall, 1973). Using national data of the United States of America on white ever-married women under 45, Bumpass and Sweet find an inverse correlation between age at marriage and marital stability. See Larry Bumpass and James A. Sweet, "Differentials in marital instability: 1972", *American Sociological Review*, vol. 37 (1972), p. 754.

[53] Ruth B. Dixon, "Women's rights, family planning and family size: an international perspective" (ESA/SDHA/AC.1/5), paper presented at the United Nations Regional Seminar on the Status of Women and Family Planning for Countries of the Western Hemisphere, Santo Domingo, 1973.

[54] Kingsley Davis and Judith Blake, 1956, *loc. cit.*

[55] Moni Nag, *Factors Affecting Human Fertility in Non-industrial Societies*, pp. 194-195.

at marriage, did not reveal any negative association between them. Another study[56] relating the degree of early marriage (represented by the percentage of married women aged 15-19 years) with the unweighted average gross reproduction rates indicates, however, such a negative association.

42. The absence of such an association in the former study may be due to the fact that the societies that were rated "high" did not have a sufficiently late average age at marriage to have a significant negative effect on their fertility levels[57] This assumption is supported by the same data on rural Ireland for 1911, which show that the fertility levels of the two groups of women married at ages under 20 years and at ages between 20-24 years differ very little, but the difference of the former group compared with others married at ages 25-29 and 30-34 years was quite significant.[58] Ireland provides a classical example of the reduction of fertility due to a very late age of women and men at marriage and to non-marriage of a considerable proportion of women and men.[59] The dynamics of Irish fertility and marital patterns are related to various socio-cultural factors, such as Catholic values concerning extramarital relationships, means of subsistence and rules of inheritance

43. There are a few other convincing evidences of a negative association between age at marriage and fertility. For example, the historical demographic study of Crulai (France) for the period 1674-1742 shows that the mean number of children per completed family was approximately 8, 6 and 4 for women who married on the average at 20, 25 and 30 years, respectively.[60] A 1930 study[61] of women in the United States of America showed that roughly something of the order of one half of the reproductive deficiency of the women below the postulated ideal performance disappeared when corrections were made for the effect of deferred marriages upon mean parities It was also found that even in 1930 the effect of contraception in reducing the fertility of the United States women was less than the effect of the delayed marriage. The recent trends towards later age at marriage among women in the United States was less than the effect of the delayed marriage This recent trend towards later age at marriage occurred after a long-term downward trend since the 1890s and particularly during the 1940s and 1950s. The recent trend in the decline of birth rates in the United States can, perhaps, be explained mainly in terms of widespread and effective use of contraceptives, abortion and surgical sterilization, but the recent trend towards later marriage cannot be ruled out as an associated factor.[62] Some studies[63] done in Latin America indicate that the effect of the decrease in fertility due to increased age at marriage may be offset by higher fertility levels among the older cohorts Some studies[64] in Latin America suggest that a significant proportion of urban-rural fertility differentials observed there may be due to delayed marriage in the cities The importance of a decrease in the number of married women aged 15-19 in the reduction of Argentine fertility has been pointed out by Rothman and de Janvry.[65]

44 Several studies concerning the association between age at marriage and fertility have been conducted in India[66] One survey conducted in the 1950s showed that the completed fertility of women marrying between 14 and 17 years was 5 9, while that of women marrying between 18 and 21 years was only 4.7[67] Another study in an urban community found that, with reference to fertility, there is an optimum age at marriage for women. In Mysore it has been shown that a rise in the age of women at marriage from under 15 years to 16-18 years would produce a rise in fertility, but postponement of marriage to 19-21 years or beyond would produce an appreciable decline in fertility[68] Agarwala

[56] *Measures, Policies and Programmes Affecting Fertility, with Particular Reference to National Family Planning Programmes*, Population Studies, No 51, (United Nations publication, Sales No E 72 XIII 2), p 50

[57] The average age at marriage was regarded as "high" if it was estimated as 18 years and over, and "low" if it was less than 18 years See Moni Nag, *Factors Affecting Human Fertility in Nonindustrial Societies*, pp 89-90

[58] The average number of live births for women married at under 20, 20-24, 25-29 and 30-34 years were 8 81, 8 04, 6 79 and 5 57, respectively. See D V Glass and E Grebenik, "The trend and pattern of fertility in Great Britain", *Papers of the Royal Commission on Population* (London, 1954), vol 6, part 1, p 271.

[59] Frank Lorimer, *op cit*, pp 171-176; K H Connell, "Land and population in Ireland 1780-1845", in D V Glass and D E C Eversley, eds, *Population in History Essays in Historical Demography* (London, E Arnold and Co, 1965), p 428

[60] Louis Henry, "The population of France in the eighteenth century", in D V. Glass and D E. C Eversley, *op. cit*, pp 434-456 See also Etienne Gautier and Louis Henry, *La Population de Crulai, Paroisse Normande* (Paris, 1958) At the same time, the danger of generalizing is signalled by Longone, who points out that before 1750, in completed families in which the wife married at age 20, the mean number of children born was 10 8 at Sainghin, 8 3 at Crulai and 6 6 at Saint-Sernin and Thezels See P Longone, "La Démographie historique", *Population et Sociétés* (France), No 17 (1969), p 3

[61] Raymond Pearl, *The Natural History of Population*, London School of Hygiene and Tropical Medicine, Heath Clark Lectures (London, Oxford University Press, 1939), pp 155-160 The conclusions are, however, based on questionable assumptions and non-representative samples

[62] Arthur A Campbell, *loc cit*

[63] See El Colegio de Mexico, Centro de Estudios Económicos y Demográficos, *Dinamica de la Población de Mexico* (Mexico, 1970), pp 52, 55, Centro Latinoamericano de Demografia, *op cit*, p 6

[64] Robert O Carleton, "Crecimiento de la población y fecundidad diferencial en América Latina", (Santiago, Chile, Centro Latinoamericano de Demografía, 1966), p 36

[65] Ana Maria Rothman and Barbara de Janvry, "Relacion [illegible]

[66] For more detailed summary of results see, *Measures, Policies and Programmes Affecting Fertility, loc cit*, pp 50-51, Geoffrey Hawthorn, *op cit*, p 26

[67] *The Mysore Population Study A Report of a Field Survey Carried out in Selected Areas of Mysore State, India*. Population Studies, No 34 (United Nations publication, Sales No E 61 XIII 3)

[68] J N Sinha, "Fertility and age at marriage", *Bulletin of the International Statistical Institute* (United Kingdom), vol 33 (1954), pp 113-126.

of his father. The father is doomed to a particular kind of hell unless these rites are performed. The word for son in Sanskrit is *putra,* which literally means one who saves from *put*, the hell.[46] This belief still holds for many contemporary Hindus and encourages early marriage for men since a son can be begotten only through marriage.

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40. The social advantage of a delayed age at marriage of women is often pointed out in terms of the time this delay allows them to develop their own abilities and shape their own ambitions. It may make them more selective with respect to whom they wish to marry, thus leading to a more satisfactory life, whether married or not.[51] Many early marriages in western societies result from pre-marital conceptions. Presser[52] points out that the postponement of early motherhood and hence of early marriage in these societies could lead to greater marital stability and greater diversity of life-styles for women. The United Nations has declared that child marriage and betrothal of young girls before puberty should be prohibited. The range of legal minimum ages for the marriage of women lies between 12 and 20 years across countries, while actual averages are somewhat higher. Dixon[53] has shown that in most countries the average age at first marriage of women tends to be higher among educated and employed women and higher in urban than rural areas.

Age at marriage and fertility

41. If contraceptives and other birth-control methods are used widely and effectively in a society, the age at marriage is not expected to have any direct significant effect on its fertility level. Undoubtedly, however, it is one of the most important among the 11 "intermediate" variables identified by Davis and Blake,[54] through which, and only through which, fertility level can be affected, particularly in a non-contraceptive situation. Unfortunately, neither the fertility data nor the data regarding age at marriage are available for a sufficient number of non-contraceptive societies so that a satisfactory statistical analysis can be made to determine the significance of their association. A cross-cultural study[55] of 48 non-industrial societies, which were rated as "high" and "low" in terms of some quantitative criteria concerning fertility level and age

[46] Moni Nag, *Factors Affecting Human Fertility in Non-industrial Societies*, p. 60.

[47] *Ibid*., p. 92; Frank Lorimer, loc. cit., p. 158; Judith Davis-Blake, "Parental control, delayed marriage and population policy", in *Proceedings of the World Population Conference, 1965*, vol. II, *Fertility, Family Planning, Mortality*, p. 133.

[48] J. Davis-Blake, *loc. cit*., pp. 131-136.

[49] James H. Leathem, "The effects of aging on reproduction", in Joseph Thomas Belardo, ed., *The Endocrinology of Reproduction* (New York, 1958), p. 320.

[50] Robert R. Kuczynski, "South African Commission Territories. East Africa, Mauritius, Seychelles", in *Demographic Survey of the British Colonial Empire*, vol. 2 (London, 1949), pp. 612 and 871; M. F. Ashley Montagu, *Adolescent Sterility* (Springfield, Illinois, Charles C. Thomas, 1946), pp. 90 and 121; A. J. Coale and C. Y. Tye, "The significance of age-patterns of fertility in high fertility populations", *Milbank Memorial Fund Quarterly*, vol. 39 (1961), p. 262.

[51] Suzanne Keller, "The future status of women in America in demographic and social aspects of population growth", in Charles F. Westoff and Robert Parke, eds., *The Commission on Population Growth and the American Future Research Report*, vol. I (Washington, D.C., 1972), p. 272.

[52] Harriet B. Presser, "Perfect fertility control: consequences for women and the family", in Charles F. Westoff and others, *Towards the End of Growth: Population in America* (Englewood Cliffs, New Jersey, Prentice-Hall, 1973). Using national data of the United States of America on white ever-married women under 45, Bumpass and Sweet find an inverse correlation between age at marriage and marital stability. See Larry Bumpass and James A. Sweet, "Differentials in marital instability: 1972", *American Sociological Review*, vol. 37 (1972), p. 754.

[53] Ruth B. Dixon, "Women's rights, family planning and family size: an international perspective" (ESA/SDHA/AC.1/5), paper presented at the United Nations Regional Seminar on the Status of Women and Family Planning for Countries of the Western Hemisphere, Santo Domingo, 1973.

[54] Kingsley Davis and Judith Blake, 1956, *loc. cit.*

[55] Moni Nag, *Factors Affecting Human Fertility in Non-industrial Societies*, pp. 194-195.

at marriage, did not reveal any negative association between them Another study[56] relating the degree of early marriage (represented by the percentage of married women aged 15-19 years) with the unweighted average gross reproduction rates indicates, however, such a negative association.

42. The absence of such an association in the former study may be due to the fact that the societies that were rated "high" did not have a sufficiently late average age at marriage to have a significant negative effect on their fertility levels.[57] This assumption is supported by the same data on rural Ireland for 1911, which show that the fertility levels of the two groups of women married at ages under 20 years and at ages between 20-24 years differ very little, but the difference of the former group compared with others married at ages 25-29 and 30-34 years was quite significant[58] Ireland provides a classical example of the reduction of fertility due to a very late age of women and men at marriage and to non-marriage of a considerable proportion of women and men.[59] The dynamics of Irish fertility and marital patterns are related to various socio-cultural factors, such as Catholic values concerning extramarital relationships, means of subsistence and rules of inheritance.

43. There are a few other convincing evidences of a negative association between age at marriage and fertility. For example, the historical demographic study of Crulai (France) for the period 1674-1742 shows that the mean number of children per completed family was approximately 8, 6 and 4 for women who married on the average at 20, 25 and 30 years, respectively.[60] A 1930 study[61] of women in the United States of America showed that roughly something of the order of one half of the reproductive deficiency of the women below the postulated ideal performance disappeared when corrections were made for the effect of deferred marriages upon mean parities It was also found that even in 1930 the effect of contraception in reducing the fertility of the United States women was less than the effect of the delayed marriage. The recent trends towards later age at marriage among women in the United States was less than the effect of the delayed marriage This recent trend towards later age at marriage occurred after a long-term downward trend since the 1890s and particularly during the 1940s and 1950s. The recent trend in the decline of birth rates in the United States can, perhaps, be explained mainly in terms of widespread and effective use of contraceptives, abortion and surgical sterilization, but the recent trend towards later marriage cannot be ruled out as an associated factor[62] Some studies[63] done in Latin America indicate that the effect of the decrease in fertility due to increased age at marriage may be offset by higher fertility levels among the older cohorts Some studies[64] in Latin America suggest that a significant proportion of urban-rural fertility differentials observed there may be due to delayed marriage in the cities The importance of a decrease in the number of married women aged 15-19 in the reduction of Argentine fertility has been pointed out by Rothman and de Janvry[65]

44. Several studies concerning the association between age at marriage and fertility have been conducted in India[66] One survey conducted in the 1950s showed that the completed fertility of women marrying between 14 and 17 years was 5 9, while that of women marrying between 18 and 21 years was only 4 7[67] Another study in an urban community found that, with reference to fertility, there is an optimum age at marriage for women In Mysore it has been shown that a rise in the age of women at marriage from under 15 years to 16-18 years would produce a rise in fertility, but postponement of marriage to 19-21 years or beyond would produce an appreciable decline in fertility[68] Agarwala

[56] *Measures, Policies and Programmes Affecting Fertility, with Particular Reference to National Family Planning Pro-* [illegible]

[illegible] at under 20, 20-24, 25-29 and 30-34 years were 8 81, 8 04, 6 79 and 5 57, respectively See D V. Glass and E Grebenik, "The trend and pattern of fertility in Great Britain", *Papers of the Royal Commission on Population* (London, 1954), vol 6, part 1, p 271

[59] Frank Lorimer, *op. cit*, pp 171-176, K H Connell, "Land and population in Ireland. 1780-1845", in D V. Glass and D E C Eversley, eds, *Population in History Essays in Historical Demography* (London, E Arnold and Co, 1965), p 428

[60] Louis Henry, "The population of France in the eighteenth century", in D V. Glass and D E. C Eversley, *op. cit*, pp 434-456 See also Etienne Gautier and Louis Henry, *La Population de Crulai, Paroisse Normande* (Paris, 1958). At the same time, the danger of generalizing is signalled by Longone, who points out that before 1750, in completed families in which the wife married at age 20, the mean number of children born was 10 8 at Sainghin, 8 3 at Crulai and 6 6 at Saint-Sernin and Thezels See P Longone, "La Démographie historique", *Population et Sociétés* (France), No 17 (1969), p 3

[61] Raymond Pearl, *The Natural History of Population*, London School of Hygiene and Tropical Medicine, Heath Clark Lectures (London, Oxford University Press, 1939), pp 155-160 The conclusions are, however, based on questionable assumptions and non-representative samples

[62] Arthur A Campbell, *loc cit*

[63] See El Colegio de Mexico, Centro de Estudios Económicos y Demográficos, *Dinamica de la Población de Mexico* (Mexico, 1970), pp 52, 55, Centro Latinoamericano de Demografia, *op cit*, p 6

[64] Robert O Carleton, "Crecimiento de la población y fecundidad diferencial en América Latina", (Santiago, Chile, [illegible]

[66] For more detailed summary of results see, *Measures, Policies and Programmes Affecting Fertility, loc. cit*, pp. 50-51, Geoffrey Hawthorn, *op cit.*, p 26

[67] *The Mysore Population Study A Report of a Field Survey Carried out in Selected Areas of Mysore State, India*, Population Studies, No 34 (United Nations publication, Sales No. E 61 XIII 3)

[68] J N Sinha, "Fertility and age at marriage", *Bulletin of the International Statistical Institute* (United Kingdom), vol 33 (1954), pp 113-126.

Variation in family types

54. In order to get a rough idea of the cross-cultural variation of the prevailing family types, there is no better alternative than to depend mainly upon the available ethnographic sources. Murdock[83] has compiled from these sources socio-cultural materials including the "prevailing form of domestic or familial organization" for 412 clusters of societies from different regions of the world. Following the principles laid down by him concerning adequate representation and other criteria, it has been possible to categorize 286 societies according to their "prevailing form of domestic or familial organization".[84] Their distribution in the six different regions of the world is presented below in tabular form.

[83] P. Murdock, "Ethnographic atlas: a summary", *Ethnology* (United States of America), vol. VI, No. 2 (1967), pp. 109-236.
[84] *Ibid.*, pp. 111-114.

Familial organization	*Africa*	*Circum Mediterranean*	*East Eurasia*	*Insular Pacific*	*North America*	*South America*	*Total*
Extended . . .	26 (50.0)	16 (40.0)	22 (43.1)	21 (40.4)	28 (62.2)	22 (47.8)	135 (47.2)
Stem	0 (0.0)	5 (12.5)	8 (15.7)	3 (5.8)	2 (4.4)	1 (2.2)	19 (6.6)
Nuclear . . .	0 (0.0)	11 (27.5)	6 (11.8)	7 (13.5)	3 (6.7)	9 (19.6)	36 (12.6)
Independent with limited polygyny	6 (11.5)	4 (10.0)	13 (25.5)	17 (32.7)	9 (20.0)	9 (19.6)	58 (20.3)
Independent with common polygyny	20 (38.5)	4 (10.0)	0 (0.0)	4 (7.7)	3 (6.7)	5 (10.9)	36 (12.6)
Independent with common polyandry	0 (0.0)	0 (0.0)	2 (3.9)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.01)
TOTAL	52	40	51	52	45	46	286

SOURCE: Based on principles in G. P. Murdock, "Ethnographic atlas: a summary", *Ethnology* (United States of America), vol. VI, No. 2 (1967), p. 155.

Note: Figures in parentheses represent the percentages of different forms in each region. For the present purpose 10 different forms identified by Murdock have been condensed into six.

55. The table given above illustrates the variation in "prevailing" family types, as well as the diversity within each region. Some of the results, however, would come as a surprise to those whose concept of the socio-cultural unit is identical with that of a country. It would be difficult for most contemporary North Americans to believe that only 6.7 per cent of their societies are characterized by the nuclear family. But this figure would not appear to be erroneous if they were aware that, for the study of human cultural institutions, a socio-cultural unit comprising only, say, 500 people, is equally important as one comprising 200 million people. Moreover, anthropologists describing a society very often do so in terms of "ethnographic present", that is, in terms of the situation existing prior to any significant cultural influence from outside. Despite these supportive arguments, one should be very cautious in taking too seriously the typological distribution in the table for the following reasons, among others: (*a*) data are compiled only from the societies for which literature is available; (*b*) not all of these works are written by trained anthropologists; (*c*) it is very difficult to decide whether the description relates to ideal or actual patterns.

56. It should be remembered that the percentage distribution would be very different from that given above in the table if any of the following alternative procedures were to be adopted: (*a*) taking a country as a unit; (*b*) referring to percentages of residential or interactional types of family existing in a society at a particular point in time (for example, the 1960s); (*c*) giving differential weights to units according to their respective total population. There would be specific difficulties and limitations with respect to each of these procedures, but they deserve consideration when doing further comparative research on family and kinship.

Nuclear family: socio-cultural correlates

57. Early theories to the contrary, the nuclear family does not appear to be associated only with a high level of technology. The social organization of many societies with primitive technology (for example, the Bushmen of Africa and other hunting-gathering peoples for whom the small family is an asset in terms of mobility and distribution of resources) is based on the nuclear family.

58. The nuclear family has existed for centuries in Europe. Evidence has recently appeared which denies the widespread existence in pre-industrial Europe of the "Classical Family of Western Nostalgia", i.e., large patriarchal kin groupings.[85] The social organization

[85] Peter Laslett, *loc. cit.*, p. 8; William J. Goode, "The theory and measurement of family change", in E. H. Sheldon

(Continued on next page)

of feudal mediaeval Europe centred on the nuclear family, and it maintained that urban rather than rural families of pre-industrial Europe were more likely to be extended [86] Any declines in family size witnessed over the past century can be attributed more to declining fertility than to structural changes

59 Even if industrialization did not provide its impetus, it is, none the less, maintained that the nuclear family is highly adaptive to modern life, since nuclear families are mobile and provide the emotional fulfilment missing in industrial jobs. On the other hand, the harmful aspects of the mobility provided by the nuclear type of family has been stressed by some authors. Mead [87] points out that the chance of a post-partum depression for a woman in the United States of America is directly proportional to the distance she is from any relative or friend She states sarcastically that the "form —the Nuclear Family—was not named after the Bomb, ... but ... it is just about as dangerous as the Bomb".

60 Four phases have been described for the cycle of the nuclear family in modern industrial societies: (1) the phase of expansion; (2) the phase of dispersion; (3) the phase of independence; and (4) the phase of replacement [88] The phases are adopted from the Fortes model for the domestic group described earlier, with the addition of the "independence" phase, a period when children have left home, and husband and wife are still alive and active. The phase of independence is important where mortality is low and many parents survive long beyond their children's marriages. Over the past half a century in the United States, with lowered fertility and a reduced age at completion of childbearing, coupled with increased life expectancy, the relative length of these phases has modified considerably. The net result is an increasing phase of independence with its associated social problems, such as providing for the elderly in terms of social life and medical care and creating alternatives for healthy middle-aged women who have outlived their motherhood roles Furthermore, as is true of all family types, class and ethnic differences in the timing of the phases, as well as in the achievement of the ideal type, have been observed Members of the higher social classes, for example, are more likely to delay marriage and childbearing in order to pursue advanced education. [89] Non-white families in the United States are less likely than white families to be nuclear; [90] more households are headed by women, and grandchildren and parents of the heads are present more often than in white families. [91] The same is true for lower-class Negroes in Guyana, where, despite the prevailing ideal of the nuclear family, the inferior social position of males considerably diminishes their status-conferring function in the family and thus in part accounts for the high frequency of woman-headed households [92]

61. Christianity has been related in several ways to the nuclear family. Whereas the religions of societies where extended familial organization prevails frequently encourage ancestor worship, Christian scripture reads, "Let the dead bury the dead", thereby implying the independence of the generations Furthermore, the newly wed "leaves his father and his mother", thus establishing neolocal residence and the freedom from wider kinship responsibilities which that signifies [93]

62 It is frequently remarked that conjugal roles are much more intimate in nuclear than in extended families Where husband and wife have fewer obligations to their original lineages and also fewer expectations from them, this greater emotional dependency would be expected Husband-wife communication is heightened, and this fact may have significant bearing on decisions regarding reproduction [94] Equally, if not more important for fertility, the nuclear family has tended to encourage later marriages, as described in the section on age at marriage, than in societies where extended family systems prevail.

Extended family socio-cultural correlates

63 For the purposes of this paper, the extended family is defined as any group of related persons living together which includes, but is larger than, the nuclear family of parents and their unmarried offspring. This term is intended to include what is referred to in the literature as collateral and generational "extended" families, "joint" families, "stem" families and "consanguineal" families. [95] Characterizing a society as extended

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and W. E Moore, eds, *Indicators of Social Change* (New York, Russell Sage Foundation, 1968), p 321. For an interesting French comparison see Alain Collomp, "Famille nucléaire et famille élargie en Haute-Provence au XVIII[e] siècle (1703-1734)", *Annales* (France), vol 27 (1972), pp 969-975. Several other articles and brief reviews in the same volume deal with French studies in historical demography and especially "family reconstitution".

[88] [illegible] *Present* [illegible] *American* [illegible] *Medicine*, 280-294.

[90] *Ibid*, p 287.

[91] I B Taeuber, "Change and transition in family structure" [illegible]

[95] The important debate over distinctions between these types is therefore minimized here, but their value should be recognized inasmuch as intrafamilial and other roles can be expected to vary accordingly A man's authority in a patrilocal extended family, for instance, will depend in large measure upon whether he and his wife and children are living with his father's family of procreation or with his brother's, his relationship to the head may in turn influence his and his wife's decisions about reproduction For detailed discussions on the stem family as a type distinguished from the extended family, see Thomas K. Burch, "The size and structure of families [illegible] nuclear family unit may never be present.

rests on whether or not a majority of the people can be found in an extended family over significant proportions of their lifetimes.

64. Although the family of interaction is not the focus of this paper, its importance cannot be overlooked, particularly in the case of the extended family. In some cases, the criterion of "living together" may prove artificial since extensive help- and visiting-networks may exist between relatives who are close neighbours of one another.[96] Such broader networks physically outside the nuclear family may also influence its internal functioning; for English couples, conjugal role-segregation has been shown to increase with close-knit as opposed to loose-knit kin networks on the part of the spouses.[97] Families in a nuclear phase, or separated only for purposes of employment, may still abide by the roles and obligations which would be expected of them were they living together; thus it is very common in India for brothers residing apart in nuclear units to contribute towards the education and marriage expenses of each other's children.[98] For young married couples in the United States of America, the financial assistance of parents can be considerable; and it is ironical that this extended kin dependence enables them to maintain themselves at least spatially independent. Still, a stage of "living together" may never occur. A survey[99] in Bogota showed that in the year preceding the survey one third of married women had received assistance from members of their families of orientation. Elsewhere, an investigation of wives attending one of the Family Planning Clinics at Isfahan concluded that "the influence of a mother or a mother-in-law, felt very frequently, can either support or undercut the counsel of a clinician seen by a woman only occasionally".[100]

65. For reasons such as those given above, it has been suggested that the term "extended family household" be distinguished from the "extended family", with the latter meant to cover "all relatives in habitual contact with a person, irrespective of whether they live with him".[101] Since the data limitations currently prevent any generalization beyond "extended family household" composition, one can only acknowledge the importance of the interaction system, while continuing to employ "extended family" as a term implying related persons in co-residence.

66. Whether cultural ideals for the large extended family could ever have been actually realized is a subject which has fostered an important debate in the literature. On the one hand, it is claimed that despite wide variations in cultural ideals, in practice, most societies have been characterized by families of similar small size owing to the high mortality and short life expectancies prevailing until recent times.[102] Others argue that sociological mechanisms, such as adoption and other means of incorporation, exist in all societies to ensure that enough kin, fictive as well as genetic, shall be mustered to fulfil functions associated with the variety of cultural ideals.[103] The case of the Japanese provides an example of the latter. When a man has no son to carry on the patriline, he adopts a man who takes on the family name, marries one of his daughters and serves as his heir.[104]

67. The ethnographic literature is replete with such examples of fusion of outside members, but the mere existence of such arrangements tells nothing of the frequency with which they are employed. In a very important test of the hypothesis positing the universal similarity of household size, Burch,[105] using United Nations data on household size, has shown that, in fact, the range across countries is small, with by far the majority of them averaging households of from three to six persons. Still, within this range there is a bi-modal distribution, with the developed countries occupying one peak at from three to four persons per household and the developing countries occupying another peak of about five or more. The author suggests that the higher fertility alone of the developing countries could account for this limited difference and that the large extended families are extremely rare in practice. He later appears partially to contradict the differential fertility hypothesis by comparing the households of several countries by presence of other relatives.[106] Thus, whereas households in India are only twice as large as households in the United States of America, they contain six times as many "other relatives". The point is well taken that despite small differences in size across countries, an analysis of the composition of those differences may be qualitatively very important. Thus, the presence of an adult "other relative" may have a very different meaning for intra-familial interaction than the presence of an additional child of one's own.

68. With reference to household size, Goody[107] notes that variability is limited "in spite of, not because of, variations in fertility and mortality". Thus, instead

[96] Sarma has coined the term "kinship neighbourhoods" to describe this situation. See Jyotirmoyee Sarma, "The nuclearization of joint family households in West Bengal", *Man in India* (India), vol. 44 (1964), pp. 193-206.

[97] Elizabeth Bott, *Family and Social Network* (London, Tavistock Publications, 1971).

[98] M. S. Gore, "The traditional Indian family", in M. F. Nimkoff, ed., *Comparative Family Systems* (Boston, Mass., Houghton Mifflin, 1965), p. 216.

[99] Elizabeth L. Johnson, "Lower-income mothers in Bogota", in J. Mayone Stycos, ed., *Ideology, Faith, and Family Planning in Latin America* (New York, 1971), p. 323.

[100] John Gulick and Margaret E. Gulick, "Kinship, contraception and family planning in the Iranian city of Isfahan", paper prepared for IX International Congress of Anthropological and Ethnological Sciences, Chicago, Illinois, 1-8 September 1973.

[101] Peter Laslett, *loc. cit.*, p. 30.

[102] Marion J. Levy, Jr., "Aspects of the analysis of family structure", in Ansley J. Coale and others, eds., *Aspects of the Analysis of Family Structure* (Princeton, N.J., Princeton University Press, 1965), pp. 1-63.

[103] Lloyd A. Fallers, "The range of variation in actual family size: a critique of Marion J. Levy, Jr.'s argument", in Ansley J. Coale and others, *op. cit.*, pp. 70-82.

[104] Ezra F. Vogel, "The Japanese family", in M. F. Nimkoff, *op. cit.*, p. 288.

[105] T. K. Burch, *loc cit.*, pp. 347-363.

[106] *Ibid.*, p. 359.

[107] J. R. Goody, "The evolution of the family", *loc. cit.*, p. 115.

of attributing similarities to demographic determinism, he reasons that cultural mechanisms, such as marriage, adoption and inheritance, serve to limit rather than augment household size. This argument is in line with his general contention that the units of production (the term he prefers rather than family or domestic group) are necessarily small in all societies.

69. A few examples of extended family cycles in different societies are described below Despite the reasonable claim which might be made that there are as many family cycles as there are families, none the less, certain general cyclical patterns can be identified for broadly defined groups of people

70 The Indian extended family has perhaps received the most attention. For North India three phases of the developmental cycle have been suggested: (1) replacement of daughters by daughters-in-law; (2) demise of the senior male agnate, (3) severance of male siblings' co-parcenary ties [108] Within the cycle, several family types could be distinguished an extended phase in which the parents have died and brothers, with their spouses and offspring, live together and a nuclear phase in which the brothers have split and each lives separately with his wife and children. When their sons, in turn, marry and bring home daughters-in-law, new extended families appear. Extended family dependants are not limited to spouses and offspring, first cousins, nieces and nephews may be also present. [109] The timing of the break-up of the family units differs by region One author maintains, on the basis of a review of 10 studies, that "most (rural people at least) live in either a joint or a supplemented nuclear family" She defines a family as "joint" only if it includes two or more related married couples and, according to her, "supplemented nuclear family" is "a nuclear family *plus one or more unmarried, separated, or widowed* relatives of the parents, other than their unmarried children" [110]

71. For the Balkan *zadruga*, the cyclical process is similar The sons born to a couple may elect to live independently when they marry, but more often they choose to stay at home, whether or not the father is still living The break-up of brothers occurs as their own families of procreation grow. [111] On Moala Island, Fiji, the death of a family head signals the dispersion of the grown sons; but the timing of the split depends upon family size. In the case of a large family, the break-up can come soon after the head's death, because there will be enough grown sons to meet subsistence needs. Small families wait until the grandsons of the original head have grown and can contribute to the labour force, before the split occurs When the head survives beyond the point where he can still visit the produce gardens, he is divested of his authority by one of his sons who takes over and moves into his house; and he, in turn, must retire to a smaller house until he dies [112]

72 The functions and cultural supports of the extended family have been widely discussed In the absence of organized social services provided by the larger society, the extended family has served to assure co-operation in labour, insurance against economic misfortune, child care and socialization, social security in old age and so on [113] Where high mortality results in large numbers of widows and orphans, the extended family system provides a shelter for them [114] It is supported by value systems and religious beliefs Filial piety receives particular stress, and in many societies, much rests upon ritual observances in the name of the ancestors and untarnished continuity of the family name Traditional Japanese custom, for example, maintained that ceremonial acts and respect could help assure the welfare of the ancestors, upon whom the welfare of living family members very much depended [115]

73 Whereas the nuclear family clearly has a limited life span, it is difficult to say when family formation and family dissolution take place in the extended family. A kind of immortality which emphasizes self-extension *is implied in the value systems associated with it, i e.*, the survival of the family name [116] An individual's status is also more likely to be ascribed than achieved where his position depends upon his inheritance and where his living arrangements are, to some extent, predetermined

74. Certain patterns of intra-familial relations are

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[108] H. A Gould, *loc cit*, p 417

[109] M S Gore, *loc cit*, pp 209-231.

[110] Pauline M Kolenda, "Region, caste, and family structure a comparative study of the Indian 'joint' family", in Milton Singer and Bernard S Cohn, eds, *Structure and Change in Indian Society* (New York, 1968), pp. 346-347 and 390 By definition used in this paper, "supplemented nuclear family" qualifies as extended family The author, in fact, lists 11 family types for India (plus an "other" category) which are not to be interpreted as necessary phases in any typical family cycle although, of course, every family cycle represents its own selection from any combination of these types According to her, "While the majority of people may live in such joint and supplemented nuclear families, the majority of families, defined here as commensal units, are probably nuclear in structure"

[111] E. A Hammel, "The Zadruga as process", in Peter Laslett and Richard Wall, eds, *Household and Family in Past Time* (London, Cambridge University Press, 1972), p 371.

[112] Marshall D Sahlins, "Land use and the extended family in Moala, Fiji", in Andrew P. Vayda, ed, *Environment and* ... Fifth Notre Dame Conference on Population, 1-3 D[illegible]ber 1966 (Notre Dame, Indiana, 1966), pp. 69-

ship between family type and fertility more studies on the following lines are needed: (*a*) studies based on the aggregate level (taking society as a unit); (*b*) studies collecting the marital and residential history of women, as well as their reproductive history; (*c*) studies with more refined concepts of family type than have been done so far; (*d*) studies taking family as an interactional unit rather than a dwelling unit.

Divorce and death: family dissolution

87. Socially or legally recognized marriage or union implies an expectation of its stability,[140] but most societies in the world have some institutional provisions for divorce or permanent separation of the couple in circumstances that vary tremendously from one society to another. Divorce is, perhaps, a topic on which conflicts between ideals and reality are most extreme. In France, approximately one marriage in ten ends in divorce.[141] Yet, in an attitude survey conducted by the Institut national d'études démographiques,[142] it was found that only 18 per cent of men and 22 per cent of women felt that divorce among couples with children should be permitted, except in exceptional circumstances.

88. In this paper the term "divorce" is used to include "permanent separation" if the latter is socially recognized, although for religious or other reasons, it may not be legally termed "divorce". It does not include temporary separation due to seasonal migration or other reasons. The dissolution of a marriage through divorce may or may not lead to the dissolution of family. In the case of a family consisting only of a childless couple, it does so; but in a society with extended or polygamous family as the dominant type, divorce between a couple may not result in the dissolution of family, as defined here.[143]

Variation in divorce frequency

89. Data on marital status collected in sample surveys and censuses often give information concerning the proportion of divorced women and men at the time of the survey or census, but they provide very little information about the frequency of divorce. These proportions are affected by the rate and rapidity of remarriage of the divorced persons. Hypothetically, if every person getting a divorce remarried on the same day, there would be no person with divorced status in the population.[144] A polygynously married man who divorces one of his wives may never appear as divorced.[145]

90. A satisfactory analysis of the frequency of divorce is possible for those countries for which adequate records of all marriage and divorce registrations are available. There are very few such countries in the modern world, not to speak of the past. Hence, for a cross-cultural analysis of divorce there is no alternative but to use data that are neither very reliable nor comparable.

91. Some quantitative data are available in the ethnographic literature with respect to the extent of divorce, but these data are mostly fragmentary and not directly comparable. Murdock[146] selected 40 "non-European" societies and used the available materials to rate them along a scale of "incidence" and "frequency" of divorce. He found that in 24 of these societies, constituting 60 per cent of the sample, the divorce rate exceeded that of the contemporary United States and hence concluded that "we still remain well within the limits which human experience has shown that societies can tolerate with safety".

92. In a cross-cultural study of non-industrial societies relating divorce and fertility, Nag[147] used some quantitative criteria, although very crude and approximate, to rate the societies as "high" and "low" in the frequency of divorce. Data concerning proportions of ever-married women and men who were divorced at least once were used, whenever available. For some societies, however, the proportions of ever-married women and men who were in a divorced state at a particular time were also used, on the questionable assumption that the average rate of remarriage and the average interval between divorce and remarriage did not vary appreciably among those societies. Those societies were considered "high" on the scale of divorce which had 5 per cent or more of their ever-married women or men in a divorced state at a particular time, or in which 20 per cent or more of their ever-married women or men of all ages were divorced at least once. Out of 61 societies, reasonably good data were available for 45. Twenty-two societies were rated as "high"

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[140] Only one society is known in which public opinion undermines the stability of marital relationships, the traditional Crow Indians of North America. Among them, "Divorce is exceedingly frequent, and a man subjects himself to ridicule if he lives too long with one woman". See G. P. Murdock, "Family stability in non-European cultures", in Morton H. Fried, ed., *Readings in Anthropology* (New York, 1959), p. 224; originally published in *Annals of the American Academy of Political and Social Science,* vol. 272 (1950), pp. 195-201.

[141] Elaine Jaulerry, "Les dissolutions d'union en France, étudiées à partir des minutes de jugement", *Population* (France), vol. 26 (1971), p. 143.

[142] Louis Roussel, "L'attitude des diverses générations à l'égard du mariage, de la famille et du divorce en France", *Population* (France), vol. 26 (1971), p. 114.

[143] "Instability of marriage in the Indonesian context does not automatically mean instability of the family or the so-called 'broken home' in the Western sense. It is customary for the children to follow the mother who usually returns to her parents, thereby continuing being part of a family environment". See Mely G. Tan, "The social and cultural context of family planning in Indonesia", paper prepared for the Fifth Asian Congress of Obstetrics and Gynaecology, Djakarta, 8-15 October 1971 (Djakarta, 1971), p. 14 (mimeographed).

[144] Clifford Kirkpatrick, "Family: disorganization and dissolution", in David Sills, ed., *International Encyclopedia of the Social Sciences,* vol. V, p. 316.

[145] J. A. Barnes, "The frequency of divorce", in A. L. Epstein, ed., *The Craft of Social Anthropology* (London, Tavistock Publications, 1967), p. 53.

[146] G. P. Murdock, "Family stability in non-European cultures", *loc. cit.,* pp. 220-222. The author did not provide the criteria used for the rating.

[147] M. Nag, *Factors Affecting Human Fertility in Non-industrial Societies, loc. cit.,* pp. 98 and 203.

and 23 as "low", according to the above-mentioned criteria.

93. The non-comparability of the divorce measures applies not only to non-industrial societies, which do not keep any records of marriage and divorce, but to many industrial societies. Even the United States of America is categorized as a "developing country" in this respect [148] The measures used for comparing the situation at different periods also vary For example, Campbell used the number of divorces per 1,000 married women for showing the increase in the divorce frequencies in the United States from the 1920s to 1968. It rose from 7 4 during the 1920s to a peak of 11 9 in the 1940s, and after a decline in the 1950s climbed to 10 9 in 1966 [149] By using the number of divorces per 100 marriages as a measure, Blake [150] showed that after a peak rate of 40 in 1946, it averaged 38 5 during 1959-1969. She predicted that it would exceed the 1946 rate in 1970

94. After pointing out the non-comparability and inadequacy of the measures of divorce frequency used so far, Barnes [151] has suggested collecting data from which the magnitude of divorce frequency at any given marriage duration can be computed by relating the number of divorces in a cohort within an interval to the number of marriage-years experienced by the cohort during that interval. These data, if collected from various societies, would make possible more fruitful comparative studies than have been done heretofore

Socio-cultural correlates

95 Whatever worth the ethnographic data on divorce may have for quantitative analysis, they indicate clearly that the frequency of divorce does not depend upon the technological level or economic development of a society Although various writers have stressed the higher divorce ratios among persons of lower socio-economic status in modern industrial societies, Kirkpatrick [152] points out that it contains some inconsistencies when men and women are considered separately. There is a higher incidence of divorce among college women in the United States compared with less educated women and with men at the same college level

96. Various features of kinship organization are associated with the frequency of divorce. There seems to be higher frequency of divorce in societies with matrilineal descent compared with those with patrilineal descent. In both types of societies, there is always an intimate bond between mothers and children, particularly when the children are small. Hence, the patrilineal descent groups tend to develop stronger sanctions with respect to divorce so that they do not lose the children affiliated to them by birth. Moreover, matrilineal descent is often associated with matrilineal inheritance and matrilocal residence, which is of help to women in bringing up their own children without remarriage, if necessary. The association between rules of descent and divorce frequency has not been tested statistically, but Lorimer [153] cites a number of illustrations from African societies to support the hypothesis

97. The societies in which the marital partners are chosen by parents or other kin are likely to have lesser frequency of divorce than those in which the partners themselves choose Ethnographic reports suggest three reasons for this difference· (1) arranged marriage is very often associated with the payment of "bride price" and dowry, which make divorce difficult in various ways, (2) parents with their greater worldly experience are more likely to make a better judgement than the prospective marital partners who, in most non-industrial cultures, are very young, (3) if there is control by a kin-group in arranging a marriage, it is likely to have control over its dissolution also [154]

98 It was previously stated that arranged marriage is more customary in societies characterized by extended family compared with those characterized by nuclear family This may contribute to a higher frequency of divorce in the latter societies But other reasons have also been suggested for a higher frequency of divorce in societies with a nuclear family orientation. As the marriage in such societies is often based on mutual attraction, the husband-wife relationship is expected to be very close and intensely emotional. Goode [155] thinks that this exclusive emotional dependence between husband and wife, without any recourse to dependency on a larger kin group, may lead to a high divorce rate. But he also points out that in this situation the chances of remarriage are also high because there is no larger kin group to absorb the children or to prevent it.

99. The association between kinship organization and divorce frequency does not always follow the same direction The importance of extended family or descent group in a society may sometimes be responsible for a higher instability of marriage. Supposed or actual sterility of a wife is, perhaps, more often con-

[148] Arthur A Campbell, *loc. cit*, p 181. The author states that "although we are able to obtain total number of divorces for all States, only half of the States report divorces in sufficient detail to permit tabulation by important characteristics such as age and duration of marriage".

[149] During 1966-1968, it rose by 16 per cent

[150] Judith Blake, "Reproductive motivation and population policy", in Edward Pohlman, ed, *Population A Clash of Prophets* (New York, 1971), p 316

[151] J A Barnes, *loc cit*, pp 47-61, 91-99 He presents a table comparing the number of divorces per annum per 100 existing marriages at specified marriage durations for the following societies Fort Jameson Ngoni (Northern Rhodesia), 1955, Australia, 1954, London, 1939 This comparison demonstrates that divorces in two societies may be similar in one respect but different in another. Barnes' findings were later compared with the divorce statistics of a Senegalese group. See Luc Thoré, "Mariage et divorce dans la banlieue de Dakar", *Cahiers d'études africaines* (France), vol 4 (1964), pp 527-545

[152] C Kirkpatrick, *loc cit*, p 316

[153] F Lorimer, *loc. cit*, pp 73-86

[154] G. P Murdock, "Family stability in non-European cultures", *loc. cit.*, p 223

[155] *The Contemporary American Family*, *op. cit.*, p 374.

sidered a reasonable ground for divorce in such societies than in others.[156] The traditional familial unit known as *ie* in Japan provides an example. The *ie* had the major role in the selection of a bride and also decided "whether or not the young bride should be returned to her family because of negligence, poor attitude or failure to provide a son".[157]

100. The weakening of the *ie* in Japan, along with the process of modernization, has resulted in a divorce trend which differs from the general trend in other countries. In the 1960's, about one in ten marriages ended in divorce, which is about one third the rate in 1885. Urbanization in Japan is one of the main factors responsible for the weakening of *ie* and the decrease in frequency of divorce.[158] In general, urbanization is reported to be associated with higher frequency of divorce.[159]

101. Religion is one of the most important cultural factors affecting the frequency of divorce. The Catholic religion forbids divorce on any ground. In some predominantly Catholic countries, divorce is not permitted under any conditions, although the physical separation of the spouses may be authorized in special circumstances. In one or two Catholic countries, only non-Catholics may be allowed to divorce.[160] Hinduism also did not permit divorce under any condition until the Hindu Marriage Act of 1955. But the Hindus of lower castes never followed the religious prohibition on divorce as much as those of the higher castes.[161] Until recently, the Moslem religion allowed the husband to divorce his wife without showing any grounds, but a Moslem wife could divorce her husband only through a judge or through a special provision made in the marriage contract. The actual situation currently prevailing among the Islamic societies is not known.[162] In 1966, it was reported that in the United Arab Republic, efforts were being made by women's organizations and other groups to amend laws relating to the unilateral right of the husband to divorce without showing any grounds.[163]

102. The question of the rights and status of women in relation to divorce is discussed below. Murdock's[164] cross-cultural study of "non-European" societies reveals "extraordinary equality of the sexes in rights of divorce". He found that in 30 out of 40 such societies there is no difference in the rights of women and men to terminate unsatisfactory marriage. The difficulty of divorce for women, at least in two societies (the Arunta of Australia and the Baganda of Africa) appears to be associated with the low status of women among them. In most of the Western societies, women may have equal rights for divorce, but they face a more disadvantageous economic and social situation than men even with the provision of alimony. Women in these societies who marry and become mothers at an early age experience a higher rate of divorce than others[165] and are also perhaps in a more disadvantageous position than others because of their limited educational level and employment opportunity. In Japan, the weakening of *ie* in urban areas has improved the position of women in the family as concerns divorce, but it is also reported that the women usually make every effort to adjust to their marriage because of the lack of opportunities for them for employment and remarriage.[166] Bose[167] argues that in India the family-planning movement should be a part of the social change providing employment opportunities for women. Otherwise, according to him, it will not be possible to solve adequately the problems of divorce, separation or single living which are likely to arise as a consequence of early termination of childbearing and child-rearing.

103. The welfare of the children involved in a broken marriage is not likely to be affected as much in a nuclear family society compared with an extended family society. In the former societies, children are taken care of by kin other than the parents and do not usually suffer from severe economic and emotional deprivation when their parents get divorced. Reports about the children of divorced parents in the latter societies are not very consistent. Susser and Watson think that for normal development, children of a divorced parent need a substitute for the absent spouse.[168] Kirkpatrick finds evidence that in the United States of America divorce runs in families and children suffering from parental divorce may be involved with delinquency, illegitimacy and unwise marriage. But he also cites evidence that "children from broken homes

[156] It is difficult to validate this view statistically. Nag found, however, a statistically significant association between frequency of divorce and extent of sterility in his sample of 30 non-industrial societies. It should be pointed out that one of the main reasons for sterility in many societies is the prevalence of venereal diseases. These diseases spread more easily in societies with high frequency of remarriage and of extramarital sex relations. See M. Nag, *Factors Affecting Human Fertility in Nonindustrial Societies*, *loc. cit.*, pp. 99, 203. Even in a recent survey in the Republic of Korea, 37 per cent of male respondents stated that they would divorce if there were no children, while 45 per cent of females would agree to do so. See Lee-Jay Cho, "Economic and demographic influences on the family in Korea", in Arthur A. Campbell and others, eds., *The Family in Transition*, Fogarty International Center Proceedings No. 3 (Bethesda, Maryland, National Institutes of Health, 1971), p. 148.

[157] E. F. Vogel, *loc. cit.*, p. 287.

[158] *Ibid.*, p. 299.

[159] See for example, Sidney Goldstein, "The effect of broken marriage on fertility levels in Thailand", 1973, p. 11 (manuscript); Eugene A. Hammel, "The family cycle in a coastal Peruvian slum and village", *American Anthropologist*, vol. 63 (1961), p. 1003.

[160] *Measures, Policies and Programmes Affecting Fertility*, *loc. cit.*, p. 52.

[161] *Ibid.*, p. 53; M. S. Gore, *loc. cit.*, p. 230.

[162] *Measures, Policies and Programmes Affecting Fertility*, *loc. cit.*, p. 53.

[163] "Family planning and the status of women", interim report of the Secretary-General (E/CN.6/497), p. 21.

[164] G. P. Murdock, "Family Stability in non-European cultures", *loc. cit.*, pp. 219-228.

[165] H. B. Presser, *loc. cit.*; I. L. Bumpass and J. A. Sweet, *loc. cit.*, p. 754.

[166] E. F. Vogel, *loc. cit.*, p. 299.

[167] Ashish Bose, "Family planning and social security", *Social Change* (Journal of the Council for Social Development) (India), vol. 2, No. 3 (1972), p. 25.

[168] M. Susser and W. Watson, *op. cit.*, p. 290.

fared as well or better, according to certain criteria, than children from intact but unhappy homes".[169] According to Mead, the people in the United States still believe that the continuity of the family is fundamental to the well-being of every individual child, but there is clear evidence that frequency of divorce has been increasing. As a remedy for this discrepancy between expectation and actuality, she suggests a new "style of marriage in two steps—individual marriage and marriage for parenthood". With the current knowledge of birth control, "every child born can be a child wanted and prepared for".[170]

Divorce and fertility

104. Divorce may affect the societal fertility level in several possible ways. The most important of these, at least in non-industrial societies, is probably the reduction or complete absence of coitus for a period of time before and after divorce. This causes a loss of the reproductive period of women, which is associated with the following four variables: (1) frequency of divorce, (2) age of spouses at the time of divorce, (3) frequency of remarriage after divorce; and (4) the length of time between divorce and remarriage. Frequency of divorce has, perhaps, the maximal variability. Furthermore, data concerning it, however poor, are better than those for the other three variables. These data were used by Nag[171] to test the association between divorce and fertility in 45 non-industrial societies. No statistically significant association could be found. There were, however, a few societies in the sample whose fertility levels were negatively affected by a high frequency of divorce.

105. As divorce can affect fertility, fertility can also affect divorce. It has previously been noted that in a number of societies sterility or barrenness of women may be an important cause for divorce. Hill[172] suggests that a change in the customary or legal code from husband-initiated divorce because of sterility to divorce as adjudication of conjugal incompatibility reflects a major alteration in the society's reproductive pattern. The net effect of changes in divorce laws on fertility is difficult to determine because of the lack of knowledge concerning many intervening variables.[173]

Widowhood and widowerhood

106. Development-cycle theory enables one to avoid the tendency to categorize every minor variation in the composition of families by a specific type. It distinguishes real structural changes from temporal or incidental changes which deserve no special recognition. Gould[174] illustrates this distinction by the status of a widowed mother in a Hindu extended family. Until the Hindu Code Bill of 1955, she had no rights of inheritance. She would normally live in the collateral extended family which might have developed from the previously existing generational extended family. But if and when the collateral extended family was partitioned, she might be absorbed into any of her sons' nuclear families. Her presence there would not make it significantly different from other partitioned units from a structural point of view, although the death of her husband was crucial to a structural change in the family.

107. The death of any married person in a family brings about many changes in the life of his or her spouse and children. These changes are likely to be more significant in nuclear family societies than in those where larger kin groups are more prevalent. If the surviving spouse has not remarried, he or she, along with young children, can be absorbed in a larger kin group in the latter societies. Modern industrial societies have made provisions for such exigencies by alternative institutional means, such as the social security system, old-age homes, orphanages and so on. But various factors, including greater longevity, sex-differential with respect to life expectancy and difficulty of remarriage when widowed at a later age, are perhaps responsible for the so-called "old-age problems", particularly emotional insecurity, in these societies. There is evidence to show that the mortality of widows and widowers in the United States of America is much higher than that of its general population.[175] Widows and widowers are also reported to have more psychiatric problems than others, but a study in England[176] shows that although they suffer from such problems with greater frequency and acuteness than others for a short period immediately after their bereavement, they return to normal after a few years.

108. The problems of the children arising out of the death of one parent are also more acute in nuclear family societies. Orphanages cannot provide the needed substitute for their normal development.[177] Delinquency and unwise marriage are reported to be more frequent among them than among the children brought up with both parents.[178] The recent emergence of communes in Western societies perhaps reflects the awareness of these problems.

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[169] C. Kirkpatrick, *loc. cit.*, pp. 313 and 319.

[170] Margaret Mead, "Marriage in two steps", in Herbert A. Otto, ed., *The Family in Search of a Future* (New York, Appleton-Century-Crofts, 1970), p. 84.

[171] Moni Nag, *Factors Affecting Human Fertility in Non-industrial Societies*, *loc. cit.*, pp. 98, 203. For additional information, see M. Nag, "Patterns of mating behaviour, emigration and contraceptives as factors affecting human fertility in Barbados", *loc. cit.*, pp. 111-133. There are, however, examples of societies in which women having frequent divorces followed by quick remarriages are reported to have higher fertility than others. For example, see M. G. Tan, *loc. cit.*, p. 14, Edward G. Ebanks, P. M. George and Charles E. Nobbe, "Fertility and number of partnerships in Barbados", (Canada, 1973) (mimeographed).

[172] R. Hill, "The family and population change", *loc. cit.*, pp. 26-27.

[173] *Measures, Policies and Programmes Affecting Fertility*, *loc. cit.*, p. 54.

[174] H. A. Gould, *loc. cit.*, p. 420.

[175] A. Collver, *loc. cit.*, p. 86.

[176] A. Stein and M. W. Susser, "Widowhood and mental illness", *British Journal of Preventive and Social Medicine*, vol. 23 (1969), pp. 106-110.

[177] M. Susser and W. Watson, *op. cit.*, p. 290.

[178] C. Kirkpatrick, *loc. cit.*, p. 313.

109. Possibly in all societies more widowers than widows remarry. Some widowers do not remarry for such reasons as old age, unavailability of suitable mates, problems of intrafamily relationship and public opinion. There is perhaps no religious or customary prohibition on their remarriage in any society. But many societies have such prohibitions concerning the remarriage of widows, which are related to socio-cultural factors as well as to reproduction.

Socio-cultural correlates of widow remarriage

110. Davis and Blake[179] think that variations in the custom with respect to remarriage of widows in non-industrial societies can be explained mainly in terms of kinship structure. According to them, societies where the extended family prevails have more restrictions on the remarriage of widows than those where corporate lineage and clan systems prevail. The primary reasons are as follows: *(a)* in the former societies, remarriage outside the group of her deceased husband's immediate kin might require separation from her children; *(b)* the greater prevalence of the system of levirate in the latter societies. Although logically valid, it is difficult to find satisfactory empirical evidence to support the hypothesis. Nag[180] has shown that there are societies in Africa, and in other regions, among whom any kin-group larger than family does not function as a corporate unit except, probably, for ceremonial purposes, but among whom remarriage of widows is the usual custom. There are also societies emphasizing extended households among whom remarriage of widows is not only permitted, but encouraged.

111. The system of levirate is widespread in societies with unilineal descent group. This system does not necessarily imply the obligation of the widow to marry her deceased husband's brother. In some societies, it extends to any eligible member of his lineage.[181] The levirate system is also quite prevalent in polygynous societies.[182] But it is sometimes found in societies not emphasizing unilineal kin group or polygyny, for example, among some Hindu caste groups in Punjab Rajasthan and Gujarat in India.[183] It is quite possible that the system of levirate is positively associated with the system of bride price, which makes it somewhat obligatory for the widow to continue her contribution to her deceased husband's family in terms of reproduction and economic activity. As a step towards raising the status of women, the United Nations has recommended a ban on the levirate system, but it is not known how many countries have taken any action with regard to it.[184]

112. Of all religions, Hinduism is the only one whose scriptures strictly ban remarriage of widows.[185] These scriptures view marriage as a union of souls of husband and wife who are said to reunite after death. But the interpreters of these scriptures applied this view to the case of widows only, not to the widowers. The ideal of *pativrata* (being devoted to the husband alone), popularized by some interpreters, implies fidelity to the husband not only during the present life, but after his death. This ideal gave rise to the well-known institution of *sati*, or immolation of Hindu widows on their husband's funeral pyres. This institution was probably very rarely practised and was banned by law in 1829.

113. Due to the efforts of Indian social reformers, the remarriage of Hindu widows was legalized in 1856.[186] This legalization, however, had little effect on the upper-caste Hindus who had always observed the restriction on widow remarriage much more strictly than lower-caste Hindus. In a survey conducted in the 1960s, it was found that among some lower castes about 30 per cent of the ever-widowed were remarried, while among a few higher castes of the same region the corresponding figure was only 7 per cent.[187]

114. The same survey showed that among Muslims, 35-37 per cent of the ever-widowed women were

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[179] K. Davis and J. Blake, *loc. cit.*, pp. 227-229.

[180] M. Nag, *Factors Affecting Human Fertility in Non-industrial Societies, loc. cit.*, pp. 102, 204-206. E.g., among the Tallensi (Africa), levirate was usual, although 41 out of 61 families were of the extended type. Sometimes even old widows among them were remarried to their grandsons, as a matter of formality. See Meyer Fortes, *The Web of Kinship Among the Tallensi: The Second Part of an Analysis of the Social Structure of a Trans-Volta Tribe* (London, 1949), pp. 64 and 239.

[181] For example, among the Ashanti of Africa and the Kazakhas of Central Asia. See F. Lorimer, *op. cit.*, pp. 71 and 94.

[182] Clignet thinks that in some societies polygyny is at least partially due to levirate. See R. Clignet, "Determinants of African polygyny", in J. Goody, ed., *Kinship* (Baltimore, Maryland, 1971), p. 165. Levirate is also common among polygynous hunting-gathering societies, but they also have sororate system of marriage. See K. Gough, "The origin of the family", *loc. cit.*, p. 299. A recent survey conducted in Ghana showed that the percentage of women in polygynous marriage was less in urban areas than in rural areas. The difference was attributed to the fact that the rural family structure, especially polygyny, permits more absorption of widows. See D. I. Pool, "Conjugal patterns in Ghana", *Canadian Review of Sociology and Anthropology*, vol. 5, No. 1 (1968), pp. 246-247.

[183] M. S. Gore, *loc. cit.*, p. 222.

[184] R. B. Dixon, "Women's rights, family planning and family size", *loc. cit.*, p. 18. See also "Draft Declaration on the Elimination of Discrimination Against Women", draft art. 6; General Assembly resolution 2199 (XXI) of 16 December 1966; International Covenant on Civil and Political Rights, art. 23.

[185] The ban was imposed among high caste Hindus at about 300 B.C. Since about A.D. 1000, even a child widow, whose marriage had not been consummated, was banned from remarrying. See V. A. Altekar, *The Position of Women in Hindu Civilisation* (Banares, India, Motilal Bernarsidass, 1956), pp. 152-157.

[186] M. Nag, *Factors Affecting Human Fertility in Nonindustrial Societies, loc. cit.*, p. 102. See also K. M. Kapadia, *Marriage and Family in India*, Bombay University Sociology Series No. 3, (London, Oxford University Press, 1955), pp. 161-162.

[187] S. N. Agarwala, "Widow remarriages in some rural areas of northern India", *Demography* (United States of America), vol. 4 (1967), pp. 126-134. The author felt there was no general trend of increasing remarriage among the upper castes, "despite the fact that those who are bold enough to flout it can escape serious social sanctions against them". Gore attributes another reason for the caste differential: higher castes are usually richer; and there would be difficulties in property management if a widow who already had a son by her first husband married a second time and took the son with her to a different residential unit. See M. S. Gore, *loc. cit.*, p. 220.

remarried. There is no religious restriction on widow remarriage among Muslims It is interesting to note that all except one of the Prophet Mohammed's wives were widows [188] Despite the absence of prohibitions against remarriage of widows, however, the proportion of widowers appears to be less than that of widows in Muslim-dominated societies, indicating that the chances of the remarriage of widows are less than those of widowers [189]

Widow remarriage and fertility

115. The loss of the reproductive period of women due to widowhood mainly depends upon the following three variables. (1) frequency of remarriage of widows; (2) age interval between the husband's death and remarriage of the widow, and (3) the probability of a woman becoming a widow at different ages. A cross-cultural study of 50 non-industrial societies which were rated as "high" and "low" in the scale of proportion of widows not remarried (on the basis both of quantitative and of qualitative information) did not indicate any negative association between the proportion of widows not remarried and fertility level. [190]

116. The relationship between non-remarriage of widows and fertility has been studied more extensively for India than for any other country, because of the religious and traditional ban on remarriage of widows among Hindus. On the basis of the differences in the child-woman ratios calculated from Indian census data for the period 1901-1941, Davis concluded that the "superiority of Muslim and tribal fertility over the Hindu is due in part to their greater toleration of widow remarriage". [191] A study conducted in 1960 in rural West Bengal [192] of two Muslim groups and one Hindu group showed that the average reproductive period lost per ever-married women due to widowhood was very small in all these three groups, and the variation among the three groups was also insignificant. An analysis of the Indian census data from 1901 to 1951 showed that, on average, a woman lost roughly one child during her reproductive period because of widowhood. It should, however, be mentioned that there was a progressive decrease during this period in the loss of reproductive life because of a gradually decreasing mortality rate [193]

[188] F Lorimer, *op cit*, p 186

[189] For example, a sample survey of Java and Madura (Indonesia) conducted in 1964 showed 2 5 per cent of widowers and 14 9 per cent of widows See M. G Tan, *loc cit*, p 14

[190] [illegible]

[192] The average reproductive periods lost per ever-married woman among the Hindus, non-Sheikh, and Sheikh Muslims were respectively 1.3, 1 2 and 1 0 The average age at which the women in each group became widows was an important factor in neutralizing the effect of the difference in the frequency [illegible] *Fertility* [illegible]

[193] S [illegible] fertility [illegible] No 6 (1963)

In a recent analysis of tribal-nontribal differential fertility in India from census and survey data, it was found that there was no systematic difference between the two categories, as inferred by Davis from child-woman ratios There was, however, a difference for Madras state in 1961 and this difference can be explained mostly in terms of the difference in frequency of remarriage of widows and the average age at marriage. [194] The results obtained so far are not very conclusive, but they show that the fertility level of the Hindus, particularly of the higher castes, was to some extent negatively affected by the prohibition of widow remarriage. But there is no reason to believe that the relaxation of this prohibition may increase their fertility rate, as the forces of modernization that may stimulate this relaxation are also likely to generate conditions favourable to small family norms

Concluding remarks

117 The contribution of the present paper perhaps lies primarily in its attempt to integrate the concepts and data from anthropological, sociological and demographic literature There is a large body of sociological literature on the family, some of the recent writings relate it to population, in particular to fertility. Anthropologists have always been interested in kinship systems, emphasizing more the larger kin-groups, such as lineage, clan and domestic groups This difference in emphasis is due in part to the fact that anthropologists have traditionally studied societies in which the functions of the family, especially the nuclear family, are not easily distinguishable from those of the larger kin-groups. The anthropological concept of "development cycle", originally formulated with reference to domestic groups, is not fully applicable to all family types described in this paper But it has been shown that this concept is useful in identifying the phases and processes through which each family type may go and in avoiding simplistic generalizations concerning interrelationships of socio-cultural factors, family types and fertility.

118. The definitions and functions of marriage and family have so far been based mainly on the concepts and values prevalent in Western societies This paper gives examples of societies from various parts of the world and having attained various technological levels in order to illustrate the problems involved in formulating cross-culturally valid definitions and functions of marriage and family. It does not, however, claim to provide solutions to these problems, but it draws attention to the need for new concepts, hypotheses and empirical investigations.

119. Family-cycle variables are constrained by biological factors but they are more affected by, and also affect, other socio-cultural factors. In a broad sense, the

[194] Moni Nag. "Tribal-nontribal fertility differentials in India", *Demography India*, vol. 2, No. 1 (1973), pp 105-117. Madras is the only state in India for which the 1961 census provided the age-group data necessary for calculating the child-woman ratio separately for the "scheduled tribes"

level of technology, means of subsistence, external, political and such other factors should be included in the category of socio-cultural factors, but for the purpose of this paper these have been dealt with only peripherally. The processes of industrialization, urbanization and modernization are known to bring about long-term changes in some family-cycle variables, such as age at marriage. This paper has provided a few illustrations to show that these processes do not readily cause a change in the value systems associated with certain other family cycle variables, such as ideal type of family. It has also been shown that some family cycle variables, such as frequency of divorce, are not lineally associated with level of technology. In analysing the spatial and secular variations in family-cycle variables, it has been found that religious beliefs, kinship system, rules of inheritance and a few other socio-cultural factors are of primary importance with respect to some variables.

120. The only population component considered in this paper is fertility, in part because of its current importance in the population policies formulated by various countries and in part because of its hypothesized associations with various family-cycle variables, such as age at marriage, divorce, widowhood and family type. Although delayed age at marriage, frequent divorce and non-remarriage of widows may lead to some loss of reproductive period of women, the empirical evidence available so far does not indicate any significant negative association of these variables with fertility except in a few special cases. Some studies have been conducted on the relationship between family type and fertility; but they can actually provide very little information other than to question the proposition that the extended family system encourages high fertility. Many more conceptual and methodological refinements are needed to state anything more definitely about the relationship between family-cycle variables and fertility. This remark is applicable equally to the following three other family-cycle variables not adequately dealt with in this paper because of limitation of space: (1) non-marriage (including celibacy); (2) forms of family (monogamy, polygyny and polyandry); (3) types of unions (visiting, common-law and legal). [105]

121. Not only do family types differ across and within societies, but any one type is characterized by phases of development over time and is subject to variation in the sequence of its phases, dependent upon socio-cultural and demographic constraints. The concept of family-in-process is particularly important for those family observers making statements about changing family patterns. A distinction has to be made between cyclical and secular changes and between incidental and structural changes. Obviously, any attempt to quantify such processes at the national level is limited by information gathered in the national census and sample surveys. For example, if household data are collected without regard for the relationship among its members, accurate statements concerning family size and type cannot be generated. A series of cross-sectional data collected over time, particularly those amenable to cohort analysis, is useful for understanding the changes occurring in residential family patterns. But for understanding the changes occurring in interactional family patterns, as well as in socio-cultural and fertility patterns, intensive anthropological studies of small communities have to be undertaken along with sociological surveys. [106]

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122. It would not be possible for the present author to write a paper of this type without borrowing the ideas and data already presented by many anthropologists, sociologists and demographers. Some of them are perhaps not cited in the paper, but the author acknowledges his indebtedness to all of them and is grateful to his colleagues in the International Institute for the Study of Human Reproduction (Columbia University), who have assisted in preparing this paper within a short period of time, and particularly to Virginia Ernster, a Ph.D. candidate in Sociomedical Science at Columbia University, who has helped in all stages of the preparation of the paper, and to Christine Espeland, a Ph.D. candidate in Anthropology at Columbia University, who has helped with sources in languages other than English.

[105] For discussions on polygyny and fertility, see: V. R. Dorjahn, *The Demographic Aspects of African Polygyny* (Ann Arbor, Michigan, University of Michigan Press, 1954), pp. 849 and 857; Frank Lorimer, *op. cit.*, p. 98; Martha Little Munson and Larry L. Bumpass, "Determinants of cumulative fertility in Upper Volta, West Africa", Center for Demography and Ecology, University of Wisconsin, Working paper 73-6, Madison, 1973 (mimeographed); M. Nag, *Factors Affecting Human Fertility in Nonindustrial Societies, loc. cit.*, pp. 94-97; P. O. Olusanya, "The problem of multiple causation in population analysis, with particular reference to the polygamy-fertility hypothesis", *Sociological Review* (United Kingdom), vol. 19, new series (1971), pp. 169-176; D. I. Pool, *loc. cit.*, p. 249; J. Gomila, "Note sur la polygamie et la fécondité respective des hommes et des femmes chez les Bedik (Sénégal Oriental)", *Bulletin et Mémoires de la Société d'Anthropologie de Paris* (France), vol. 5 (1969), pp. 5-16. For discussion on types of union and fertility see: Judith Blake, "Family instability and reproductive behavior in Jamaica", in Milbank Memorial Fund, ed., *Current Research in Human Fertility*, papers presented at the 1954 Annual Conference of the Milbank Memorial Fund (New York, 1955), pp. 27-28; G. E. Ebanks, P. M. George and C. E. Nobbe, 1973, *loc. cit.*, p. 16; Dora Ibberson, "Illegitimacy and the birth rate", *Social and Economic Studies* (West Indies), vol. 5, No. 1 (1956), pp. 93-99; Anthony Marino, "Family, fertility and sex ratios in the British Caribbean", *Population Studies* (United Kingdom), vol. 24 (1970), p. 172; M. Nag, "Patterns of mating behaviour, emigration and contraceptives as factors affecting human fertility in Barbados", *loc. cit.*, p. 133; George W. Roberts, "Some aspects of mating and fertility in the West Indies", *Population Studies* (United Kingdom), vol. 8 (1955), pp. 199-227; and "Fecundidad diferencial por typo de unión y algunas de sus implicaciones en las Indias Occidentales", *Conferencia Regional Latinoamericana de Población*, Proceedings of the Conference held at Mexico City, August 1970 (Mexico, 1972), vol. 1, p. 364.

[106] Specific research needs have been stated in various sections of this paper. For a more comprehensive discussion of needed research, see I. B. Taeuber, "Continuity, change and transition in population and family: interrelations and priorities in research", *loc. cit.*, pp. 317-342.

POPULATION AND THE FAMILY: OVERVIEW *

Charles F. Westoff **

1 The Symposium on Population and the Family was convened to examine the interrelations between demographic change and the family, with particular emphasis on the "micro" perspective of population processes The focus is both on the family as it influences demographic processes and on the consequences for the family of population change The intention of the organizers has been to present the accumulated knowledge of social science on these subjects before the World Population Conference in general, and to provide the Advisory Committee of Experts on the World Population Plan of Action with information on which to base their recommendations, which, in turn, will be presented first to the Population Commission and ultimately to the representatives of Governments at the World Population Conference. This paper, as the word "overview" suggests, is an attempt to distil further this knowledge and to emphasize those issues which have some policy relevance The primary audience for this paper are viewed as those with a policy rather than with a scientific interest in the subject

2 Those in the various social science disciplines know all too well how thin and uneven available knowledge is when it comes to translating research into policy terms This general uneasiness is magnified when one turns to such ill-defined, interdisciplinary fields as the family and population. Everyone acknowledges the importance of the family; statements such as the "family is the basic social institution", "the family is the natural and fundamental group unit of society" are repeatedly and strongly asserted But statements of what might be called "firm" knowledge in the field evoke a less certain tone The papers prepared for this Symposium, on which this overview is based, reflect both the amorphous nature of the subject-matter and the uncertainty of many of its generalizations. This point is stressed because it is important to alert non-professional audiences to the fact that much of what commonly passes for knowledge in these fields is based on small-scale studies in one country or another, employing varying definitions, measurements and analytical procedures, or on greatly simplified models of complex situations. An attempt will be made to distinguish those areas in which knowledge rests on fairly firm or on not-so-firm ground. If it is any consolation, the state of much of the available knowledge about the interrelations of population change with economic, environmental, political or other social factors is not especially better grounded and in many instances is even less firm than what can be said about the effects on the family

3 Despite the organizers' good intentions, the papers for this Symposium scarcely exhaust the topic, and other background papers and information external to the Conference have been used to supplement them This is not a point-by-point summary of the papers prepared for the Symposium, although it builds on many of the contributions of most of them Some topics have hardly been covered at all in the papers for the Symposium—such as urbanization and migration—and these important subjects are excluded from this overview

FAMILY STRUCTURE AND CHANGE

4. The family is the organized group of society in *which demographic processes occur. marriage, reproduction*; mobility, dissolution; and death. Some sociologists focus on descriptions of the family as an originally all-embracing organization which historically performed functions now increasingly performed by other, more specialized agencies In some sense, the process of modernization itself can be viewed as a transfer of functions from the family to other institutions Despite these losses of such functions as the economic and educational, despite the decline in family size in the developed world, despite high divorce rates and despite some redistribution of the family's remaining functions to other institutions, the social institution of the family shows few signs of atrophy. Near-universal marriage [illegible]

[illegible]

[illegible] particular partner rather than with marriage. The family is probably the least altered of all the social institutions As Margaret Mead has quipped: "It is the only institution we have that doesn't have a hope of disappearing."

5. Anthropologists have catalogued a wide variety of family forms around the world and through history. Most comparative research has focused on the nuclear

* The original text of this paper (E/CONF 60/SYM II/11) [illegible]

** [illegible] America

or conjugal type—basically the married couple and their children, which is the most prevalent form—and the extended family, which ideally includes several generations in lineal descent, various siblings and other relatives. There are variations on this theme in different cultures. A common belief, with little support from ethnographic evidence, is that the extended type of family is the pre-modern form which features very large households and encourages high fertility, while the nuclear form is the family of modern industrial society with small households and low fertility. If there were some intrinsic, direct sociological connexions between family type and fertility, there might indeed be some policy implications. However, the nuclear family does not appear only at advanced levels of technology. It is observed in some traditional African societies as well as in early European history. It would be difficult to conclude, therefore, that the decline of fertility in the past century and a half could be attributed to changes in family structure. Despite the stereotype that different forms of family vary in size according to cultural ideals, research has revealed little variation in household size in the past because of the demographic constraints imposed by historically similar mortality and fertility. It is plausible to hypothesize that extended kinship systems probably operate to reduce the necessity for economic autonomy prior to marriage and thus encourage early marriage, but there is mixed evidence on whether extended families imply higher marital fertility than nuclear families. Fertility has declined among Western societies with nuclear families and in some Far Eastern societies (Japan, Singapore, Hong Kong and the Malay Peninsula) with more extended families. Yet, high fertility remains unchanged in Java with prevailing nuclear families and among the Bengali with extended families. This is an area where further research is clearly indicated and one where the World Fertility Survey, which is just getting under way, can make a real contribution.

6. Although the connexions between family structure and fertility remain obscure, more light is being shed on some of the effects of demographic change on family structure. In countries that have experienced the transition from high to low fertility, there has, of course, been a corresponding decline in the average size of households and families as well as an increase in the proportion of nuclear families and one-person households and decreases in the proportion of families extended across several generations. Internal migration from rural to urban areas also contributes significantly to this process.

7. One of the papers contributed to this Symposium cast new light on the effect of the demographic transition on family size. If the family is viewed as a population, and its size as the number of persons in the family multiplied by the time they live together, it is evident that the typical family of the developing world today is much larger in terms of person-years lived than its predecessor under conditions of high mortality, but that its "size" is spread out over a much greater average length of family life. Although the average family in the low mortality-low fertility stage has only half as many children as the family in the transitional stage, this "small family system" is actually somewhat larger than that of families in the initial high mortality-high fertility stage.

8. One of the consequences of increases in parent and child survival is the enormous increase (by a factor of three) in the amount of time parents and their children have available for interaction, a consequence of demographic change that must have great significance for patterns of socialization and different kinds of intra-familial relationships. One of the unique characteristics of low fertility and improved survival is the long period of time (13-14 years on the average) that the parents jointly experience after the children have grown and left home.

9. An outcome of this micro-demographic exercise is an estimate that male heirs are either not born to or do not survive 44 per cent of women under high fertility-high mortality conditions, compared with 21 per cent in populations which have experienced decline in mortality but not in fertility. In societies where such succession is important, such a sharp increase in the likelihood of having a male heir may prevent an adverse reaction to the increased burdens of child care resulting from reduced mortality and continued high fertility.

10. The lack of incentive for restricting family size may also result from the fact that the ratio of consumers (children under 15) to producers (parents and children 15 and older) within the family in person-years terms, unlike the simpler child-parent ratio, is only marginally greater in the demographic transition phase than under conditions of high mortality-high fertility. This micro-demographic perspective contrasts sharply with the usual macro-demographic dependency ratios which show a much greater disadvantage for the population in transition. Both perspectives are right. The explanation lies in the fact that the decline of mortality and resulting high increase in population growth means a sharp increase in the number of families (150 per cent per generation). Thus, although within the family the ratio of consumers to producers does not increase sharply with declining mortality, there is a sharp increase in the proportion of children in the aggregate population as a consequence of high fertility and low mortality. The policy implication is that the pressing problem of national economic development, exacerbated by the high load of dependants in the populations of developing countries, does not have a parallel at the family level except in so far as the force of population increase is reflected in perceptions of increased competition among more families. Nevertheless, both of these measures show striking improvement as a consequence of the decline of fertility.

11. One subject that is not covered in this micro-demographic exercise is the dependency of old age. One of the clearly predictable demographic consequences

of the slowing of population growth is the increase in the proportion of persons classified as "old". The proportion 65 years of age and older increases from around 3 per cent in populations with high fertility to 16 per cent in stationary population at low levels of fertility; sooner or later, this transition is inevitable. In societies that are approaching this demographic state, this transition has been reached slowly along with all of the changes implied by the term "modernization", including changes in the status of aged members of the family. Many developed societies are currently struggling with the manifold problems associated with this increase in the numbers and proportions of old people and their simultaneous alienation from the security of the small nuclear family. Their problems of health, income and social identity are serious indeed and they will inevitably increase in severity

FAMILY FORMATION AND DISSOLUTION

12 Most fertility in the world occurs within marriage, overwhelmingly in monogamous marriages. Polygamous forms exist, but demographic and social constraints minimize their frequency. The most common form of polygamous marriages, polygyny, probably reduces fertility through age differences of spouses, lack of exposure and differences in adherence to periods of post-partum abstinence There is also the possibility, however, that polygynous marriages may appear less fertile because of a tendency to add another wife if the first wife proves infertile.

13. Age at marriage, on the other hand, is of considerable significance for the amount of fertility that a marriage will produce. It has accordingly created a certain amount of interest in population policy circles

14. Most students of the subject maintain that changes in age at marriage have a much greater potential impact on the fertility of populations in which contraceptive practice is minimal. Although its influence on fertility is certainly less in contracepting populations because of the greater significance of the length of exposure to the risk of conception in populations which do not practise contraception widely, one should not minimize its importance in the developed world Recent (1970) research in the United States, for example, reveals a considerable difference in the fertility of women (married 15-19 years), ranging from an average of 4 1 for women married under 18 to an average of 2 6 for women married after 24, with linear gradations between these ages, which are hardly insignificant demographic differences.

15 Age at marriage exerts such a powerful effect on fertility because it reflects the combination of many different influences which operate either independently or which reinforce each other. In any society, the younger the woman is at marriage, the earlier she is exposed to the risk of pregnancy at highly fecundable ages (with the exception of the adolescent sterility of child marriages). Conversely, many marriages occur earlier than they might otherwise because of pre-marital pregnancy, a process that also selects the most fecundable women. Early marriage and/or early fertility forces many young people to leave school or forces women to stop work, which in turn reduces exposure to interests and activities that may compete with the marriage and maternal role. These influences affect both wanted and unwanted fertility which show a similar negative association with age at marriage. Some women are selected for early marriage who are more interested in the familial career; others who married early, having left school or work earlier than they intended, are channelled in a direction which then becomes their dominant role

16. The effective use of birth control can lower the age at marriage by making it possible for couples to marry early but postpone childbearing, thus reducing the "costs" of marriage in the sense of permitting the couple to remain in school or permitting the woman to continue to work Historically, in the developed countries, age at marriage declined by from two to five years, after the diffusion of contraception There was a very early decline in fertility in Western Europe (prior to the eighteenth century) as a consequence of important decreases in the proportions married and increases in age at marriage In some European countries, age at marriage for females reached 28, with the result of removing a great amount of highly fecundable exposure.

17 Youthful marriage and very high proportions married is the typical pattern of nuptiality in the developing world today Some countries in this category, such as Chile, Korea, Sri Lanka and Tunisia, have experienced increases in age at marriage which have evidently resulted in the beginning of declining fertility.

18 One of the advantages of increasing age at marriage in the fertility transition, as one observer suggests, is the speed of its effect. Births are prevented among younger, highly fecund couples rather than among older couples towards the end of their fertility

19. Changes in age at marriage could have significant effects on growth rates in the developing countries One calculation places the potential effect at reducing the birth rate from the 45 per 1,000 population typical of developing countries to about 30 per 1,000, if the marital fertility currently prevailing in the developing countries were combined with the nuptiality pattern prevailing in Western Europe in the early years of this century This is just an illustration of the potential [illegible]

[illegible]

sure to the risk of childbearing Moreover, later marriage increases the age at which childbearing occurs, and increasing the average age at childbearing, even without a decline in the number of children per woman, reduces the rate of growth by increasing the length of generations Of course, it is highly unlikely that such radical changes in marriage customs could occur with-

out other modernizing forces operating, which in all likelihood would be reducing marital fertility simultaneously. There is little optimism that increases in legal minimum ages of marriage would have important demographic effects, but there is some possible evidence to the contrary, for example, in Tunisia. Again, other trends of social and economic development in these countries have been operating to support such a change.

20. The non-demographic effects of raising age at marriage seem to be consistently positive. There is increased exposure of young adults to non-familial activities, including education, which contributes to economic development. It permits greater opportunities for mobility which may take the form of migration to more attractive labour markets. The avoidance of very early childbearing certainly contributes to the health of mothers and their children. One might even assert that later marriage contributes to the quality of marital and parent-child relationships. There is at least some evidence that the probability of divorce decreases with increasing age at marriage.

21. Knowledge of the connexions between marital dissolution and fertility suffers especially from inadequate data. In general, one infers the obvious: high divorce or widowhood rates will depress fertility through the reduction of the length of exposure to the chance of conception. The magnitude of the effect depends upon the age at the time of dissolution, the probability of remarriage and the length of time between marriages. Dissolution rates vary enormously around the world; divorce rates are apparently higher in societies where parental influence over the choice of partners is minimal. Cross-cultural research evidently does not support the assumption that the frequency of divorce is associated with economic development.

Women

22. The status of women is both a determinant and a consequence of reproductive behaviour. Women's health and opportunities for education and employment —in general, their level of participation in the non-familial life of the society—both influence and result from their age at marriage and their fertility.

23. The health of women is linked to reproductive behaviour in various ways. Improved health can mean potentially higher fertility through increased fecundability. The reduction of venereal disease is a case in point. Other diseases, such as malaria, rubella and tuberculosis, affect pregnancy completion. Conversely, fertility can affect health. Maternal mortality is affected by both early and very late childbearing, by short birth intervals and by high fertility, which is especially serious when one considers that one in every seven births occurs to women under 18 and above 35, the ages where risks are greatest. Maternal death rates increase markedly beyond three births. A large fraction of maternal mortality is caused by poorly performed abortions, which are, of course, a symptom of unwanted fertility. The significance of maternal mortality must, naturally, be evaluated in terms of its impact on the whole family.

24. The education of women is an especially critical factor in reproductive behaviour. One study of factors affecting age at marriage in different countries reveals the widespread importance of literacy among teen-age girls. Illiteracy rates are much higher among women than men in most countries, although the situation is evidently changing. Early marriage and childbearing interfere not only with the woman's participation in higher education but, perhaps more critically, in secondary education. The woman who avoids childbearing until her early twenties is more likely to develop interests alternative to maternal roles, is more likely to learn family planning techniques and to be more motivated to use them, is more likely to participate in the economy for longer periods and is more likely to produce fewer and healthier children. Studies of the connexions between education of women and fertility around the world show fairly consistent negative associations, although the "fertility effects" appear at higher levels of education in developed countries. These effects operate demographically both through delays in marriage and through desired family size and increased, effective fertility regulation.

25. Similar generalizations can be offered about the connexions between female employment and fertility, but they are more complicated because type of employment is important. Employment in cottage industry or in agriculture in the immediate vicinity of the home, which is common in many developing countries, does not have the same incompatibility with domestic and maternal roles that paid, full-time employment away from the home in urban, industrial sectors connotes. Such employment is very limited in developing countries for obvious reasons connected with educational and economic development. Thus, the clearest indication of the depressing effects of female employment on fertility appears in industrialized countries.

26. One difficulty in interpreting this relationship is the recurrent question of whether women who have fewer children work or whether women have fewer children in order to work. No doubt both processes operate: women who may have fewer children for whatever reasons are freer to take employment; and women who wish to work may deliberately defer marriage or childbearing in order to permit working.

27. There are many societies in which traditional roles of motherhood are highly rewarded and where the woman's prestige is associated with high fertility, especially the production of sons. It has been reported by family planning clinics in several African countries that women are often more interested in learning how to increase rather than decrease their fertility. In other Western societies, the deferral of marriage and low fertility, perhaps even childlessness among some segments, have occurred as the result of complex historical

trends. In some of these societies, the status of women has emerged, or re-emerged, as an important movement and ideology. As the technology of fertility control has improved and its diffusion has extended, the incidence of unplanned and unwanted fertility has diminished to the extent that some have raised questions about the future of the family. Although one can visualize further losses of function for the family as reproduction and perhaps the socialization of children become less demanding and perhaps increasingly performed by other specialized agencies (day-care centres, for example), it does not seem likely that the family is on the verge of disappearing As one student of the subject has phrased it: "... fertility decline indicates a rejection of parenthood, not the family".

28. In view of the potential importance of the status of women not only for demographic matters, but for many other aspects of social change, it appears striking that only a few of the economic development plans in developing countries include any reference to the disadvantaged status of women.

Children

29. Although woman's lot is closely linked to reproductive experience, it is the child who is in some ultimate sense the benefactor or victim of conditions beyond its control. High fertility has been shown repeatedly to be associated with high foetal, infant and child mortality Each of the components of high fertility exacts its toll Foetal death rates increase markedly at higher maternal ages; infant mortality is pronounced at the younger ages, under 20 and especially under 18 Short intervals between births also play a direct role in child health through their implications for foetal, infant and child mortality Lastly, high parity itself increases the risks of abortion, stillbirth and infant mortality Over and above the direct medical connexions, there are the obvious adverse implications for child health of the strain on family resources as family size increases (offset to some extent by surviving children's subsequent contributions to family income)

30. These effects are observed in both developed and developing countries. In the United States of America, for example, the postponement of the occurrence of first births until the mother was in her early twenties would have a pronounced effect on infant mortality

31 In a very real sense, children are the main subject of this Symposium. One of the prevailing theories in the field is that birth rates will decline when parents in the developing world realize that they no longer have to reproduce at such high levels in order to ensure surviving children who provide status and support in old age. Some limited support for this proposition exists at both the micro- and macro-levels. The most persuasive evidence shows higher fertility connected with the direct experience or fear of child mortality rather than in the correlations between declining infant mortality and crude birth rates which are interpretable on various grounds. The evidence is not overwhelming, but the potential significance of the relationship is certainly important enough to warrant more definitive research on the question

32. The connexions between fertility and mortality are the easily measurable ones, but they hardly exhaust the subject. There are undoubtedly less measurable dimensions of child health and development that are related to fertility and to the constellations of factors associated with large family size—low income, high density, poor sanitary conditions, malnutrition, poor medical care and limited maternal care, to name a few. Studies have linked family size to various kinds of diseases, with physical growth, with intellectual development and educational opportunity, with behaviour and psychological characteristics It is difficult, of course, to distil the pure effects of family size from the social and economic *milieux* with which it is so intricately connected Once again, it must be concluded that child health will be improved by the interrelated processes of social and economic and demographic development The general relation of health and fertility can certainly be utilized in family planning programmes It is evident that the health of mothers and of children is a powerful incentive to women and the combination of pre-natal, maternal and child care in clinics with family planning services can be potentially much more effective than such services in isolation.

Some new research directions

33 There are several new directions of research in areas focusing on the family and population One of those organized at the East-West Population Institute at Honolulu is an ambitious series of cross-cultural surveys in five Asian countries attempting to measure directly the value of children to parents The research is intended to test hypotheses about the connexions between fertility and the perceived "costs and benefits" of children

34. A conceptually related, though professionally distinct, line of inquiry is reflected in its most recent developments by a group of economists at the National Bureau of Economic Research in New York. These efforts are producing a micro-economic theory of family decision-making in which the family or household is regarded as a small firm producing things from which it derives satisfaction. Children are thus viewed as consumer goods which yield services or "utility". The demand for children is determined by the relationship between the perceived gratification of children and the amount of investment required for a given level of quality (e g , the costs of education) which are in turn related to age of parents, income etc. There are many conceptual problems involved in these attempts to apply the powerful apparatus of economic theory developed for different purposes. Moreover, solid empirical evidence in support of hypotheses derived from this

theory has not yet been forthcoming. Nevertheless, it represents the emergence of an imaginative and potentially rewarding direction of research.

35. One of the most ambitious current research efforts is the World Fertility Survey (WFS), supported by the United Nations Fund for Population Activities and the United States Agency for International Development, and administered by the International Statistical Institute. The WFS is planning sample surveys of households and interviews with women of reproductive age in order to obtain a wide variety of information about the family and reproduction in from 40 to 50 countries, with special emphasis on countries for which even rudimentary data do not yet exist. Although the WFS hopes to produce information on many different aspects of fertility, the subjects currently being proposed will permit testing numerous hypotheses about fertility and the structure of the family, age at marriage, employment of women, marital dissolution and many other characteristics of the couple. This type of research is scarcely new; what makes it noteworthy is the promise of obtaining comparable data on so many relevant subjects from so many different cultures.

36. There are other, quite different frontiers of research that may prove of radical importance for the family and population developments which can only be mentioned in passing. These include biomedical research in genetics and reproduction which may yield technology of great relevance to fertility. One such area, which some believe will become a reality in the next few decades, is the pre-determination of the sex of offspring. It seems clear that the use of such technology would operate to reduce fertility, the extent depending, of course, upon the cultural significance attached to preferences for the different sexes. Such a development could have great potential not only for fertility, but for the sex ratio and related patterns of behaviour and for intra-familial interactions. In the United States, for example, some recent research indicates that if women's preferences for the sex of their children prevailed, the proportion of families with the first-born a male and the second a female would more than double; that fertility would be slightly lower; but that the population sex ratio would only be temporarily made more masculine. Research on this subject in other countries is currently the focus of a group of scholars in a committee of the International Union for the Scientific Study of Population.

37. The improvement of fertility-control technology—methods that are more effective, more acceptable and more easily diffusable—is obviously a potentially important development for the family and fertility. Although methods currently available are certainly capable of reducing fertility if used, these methods have their disadvantages and there is the further likelihood that improved technology might attract couples with low motivation to control fertility.

38. Lastly, there are exciting new developments in genetics and reproductive biology, some of which have science-fiction qualities portending new forms of reproduction quite different from man's experience. Mankind may indeed be on the threshold of scientific developments with great though hardly immediate implications for the family through the increasing specialization of the reproductive institution. Demographic trends, the reduction of mortality and fertility, carry uncertain implications for the heterogeneity of gene pools which is still another area of research beginning to unfold.

Conclusions

39. Some provocative generalizations about the connexions between population growth and the family have been offered which seem an appropriate way to conclude this overview.[1] Bernard Berelson sees two trends of major historic importance: the trend from the large to the small family that has accompanied the whole process of modernization, a trend that is still unfolding in much of the world; and a trend towards viewing reproduction increasingly in terms of the welfare of the child, a trend that Berelson asserts is barely visible. Ryder argues that a convincing case can be made that economic development has typically required assertion of the primacy of the individual over the family, and that this was the most essential basis for modern fertility regulation. Society intervened on behalf of the individual to top the balance of power: the worker against the owner, the woman against the man, the child against the parent. In the West—and this is a Western point of view—"societies slowly but inexorably took the side of the child against the parent, specifically enforcing compulsory education—delaying more and more the entry of the child into the labour force, and establishing the claim of the child as worker over the fruits of his labour". He maintains that the "core of the solution of the problem of fertility regulation is implementation of a declaration of the rights of children. This is indeed revolutionary; what is required is a reversal of the entire temporal direction of obligation from what the child owes the parent to what the parent owes the child."

40. It has been clear from this Symposium and from the findings of countless studies of history and the contemporary world that the decline of fertility is deeply imbedded in the processes of social and economic development. Indeed, some have insisted that the reduction of fertility will only follow the modernization of the whole society, a process that could be self-defeating given the time factors involved. But it may be that the evidence on this question is not really so clear. Irene Taeuber appears to have the most appropriate formulation, that this is more an area for research rather than a field of knowledge.

[1] See annex for sources of these generalizations and of other ideas and propositions in this paper.

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* The ideas and propositions in this paper have been drawn from a wide variety of sources, but the primary sources, of course, are the papers submitted to the Symposium on Population and the Family

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ON THE IMPACT OF SOCIO-ECONOMIC AND CULTURAL FACTORS ON FAMILY DEVELOPMENT *

I. Y. Matyukha **

1. The family is a primary cell in society, reflecting all major socio-economic interrelationships in society. While the family may be regarded as an elementary unit, it is a highly complicated phenomenon, which integrates biological, socio-economic, moral, ideological and psychological relations.

2. The family in the Union of Soviet Socialist Republics is the object of study by various researchers, such as ethnographers, statisticians, and psychologists, as well as by experts in law, and in the pedagogical and medical sciences. The most general laws of family development are thoroughly studied by social sciences.

3. Economic and demographic researchers in the Soviet Union consider the family to be a group of members of a household who are related through kinship and common properties, as well as through common income and budget outlays. Thus, the family may be identified as a means of organizing family life and private consumption. The family helps to shape moral and physical properties and obligations towards society. Man's role in society, his social and occupational activities and his ability to bring up children depend considerably upon the level of well-being of the family and upon its moral and social pattern, which, as a matter of fact has a crucial significance for society as a whole and for its progress and development.

4. Being a phenomenon of public life, the family is subject to incessant changes and developments caused by a number of socio-economic factors. The social status of the family, as well as family relations, is predetermined by the kind of existing relations of production. In the socialist planned economy consistent efforts are being made with the aim of stabilizing the family as a unit of society. One of the major targets of the Soviet State is to secure the prosperity of the family, in the interest both of society and of family members. This approach is based on sound legal and socio-economic measures. The basic Act passed recently concerning marriage and family status stresses the necessity of further family consolidation based on a new kind of communist relations. This Act is a significant contribution to the development of conjugal relations on a strictly voluntary basis, proceeding from the assumption of a friendly disposition, respect and mutual affection between husband and wife, and a complete lack of any mercantile claims (as proclaimed in Article 1, "Principles of Law concerning Marriage and Family in the Union of Soviet Socialist Republics and in the Union Republics").

5. The family, as a unit of social life, is in the first instance identified by its size and structure, while changes at certain points in time testify to family development. According to the data solicited through the All-Union census of population of 1970, there were 58 million families in the Soviet Union in the reference period. There were 14 million single persons, including those living apart from their families, as well as those not sharing family budgets.

6. The average family size was 3.7 in 1970 as compared with 4.1 in 1939. While the average size of urban families has undergone no significant change in the period from 1940 to 1970, averaging 3.5, rural families have somewhat decreased from 4.3 in 1939 to 4.0 in 1970. This decrease in family size in rural areas may be attributed mainly to rural/urban migration caused by certain developments in agriculture which took place during this period throughout the Soviet Union. Rapid industrial advances were facilitated by the wider use of mechanized operations in agriculture, as well as by the higher productivity of agricultural labour.

7. By modern definition, the family is today identified as the family nucleus, consisting of a married couple and one or two children, that is, the size of the modern family depends primarily upon the number of children. This concept may be best illustrated by means of the data given below, solicited during a sample survey. Survey items covered, among other things, those concerning family structure. The starting-point was to determine the number of children in families both of urban and rural residents.

8. Table 1 shows that nearly half of the sample families had one child, while 35 per cent of the families had two children. Collective farm families markedly exceed the number of urban families with three children and above. As far as smaller families, those comprising one or two children, are concerned, the reverse is true, namely, the percentage of such families among workers and employees is larger than among collective farmers.

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TABLE 1. FAMILY DISTRIBUTION ACCORDING TO NUMBER OF CHILDREN AGED UP TO 17

(Percentages)

Type of family	Families with children aged up to 17	Families with One child	Two children	Three children	Four children	Five children and more
Total families of USSR	100	48.1	34.8	10.0	3.8	3.3
Families of workers and employees	100	50.9	35.5	8.6	2.9	2.1
Families of collective farmers	100	26.3	31.5	16.2	7.7	8.3

9. Family size reduction is an extremely intricate phenomenon Among the major factors causing family size reduction, disintegration plays an important role, primarily through newly formed young couples departing from the family Family disintegration is in most cases attributed to the changing household and economic pattern of the family.

10. Considering the rural population in the USSR, which has undergone the most significant of changes, it is expedient to note that a peasant family was the model for the agricultural production unit before the Great October Revolution of 1917, as well as in the first years of the Soviet State prior to the collectivization which was successfully implemented in the 1930s, and before the subsequent rapid industrial development in the Soviet Union A closer look at pre-revolutionary agriculture would show that a conservative stable pattern of a large peasant family, consisting of three or four married couples, was widespread The size of such a family in some cases totalled from 15 to 20 persons.

11 This conservative type of patriarchal family was necessitated by the mode of agricultural production prevailing at that time, based on private property, on means of production and on inherent labour co-operation in peasant households This kind of organization was of paramount economic importance for the family In the pre-revolutionary period, there were more than 20 million small peasant households in Russia, including poverty-stricken households amounting to 65 per cent of the total number.

12 The economic functions of the patriarchal household determined a predominant right of the ownership of the means of production, which accrued to the head of the household. This right considerably blocked the way to disintegration of households and families

13 The emergence of new relations of production caused by the development of production, the means of production being now in a collective ownership, was accompanied by the voluntary co-operation of peasant households, which took place soon after the Revolution of 1917 A basis was created thereby for a socialist transformation of agriculture There are currently some 33,000 collective farms and 15,500 State collective farms in the Soviet Union. With the emergence of large socialist agricultural enterprises, the traditional kind of peasant household is losing its former significance as a production unit and is being transformed into a socio-economic unit It may happen that personal subsidiary plots, currently owned by the rural population, will reduce and completely cease to exist with the development of socialist agriculture in the Soviet Union In this case, households in the countryside will be converted into socio-economic groups of persons calling for better management of consumption. This function is now typical for the majority of urban families of workers and employees The features of this family are the lack of any interdependence of family members caused by private property relations, and the existence of equal rights of male and female members of family, of mutual respect, of collective discussion of all major problems and of sound human attitudes

14 It is worth mentioning that family disintegration, which is a gradual transformation of the patriarchal family into the so-called democratic family, is a process which is now going on in a number of industrially developed, as well as developing, countries Some Western experts in social sciences are evidently correct in assuming that family disintegration has become a general tendency

15. The democratic family is defined as a family where the scope of influence has been primarily subdivided according to an accepted decision concerning the division of labour. Administration is thus subdivided into two nearly equal shares This kind of family is based on mutual respect and affection, leaving no place for fear and force.

16 One should bear in mind, however, that the actual democratic transformation of the family, which will have no hierarchy whatsoever, is realistic only if it is based on a stable socio-economic status, as well as on a real position of equal rights of man and woman in society.

17. Sound housing and the provision of the population with housing facilities are important factors in family disintegration The urgent need to have a proper house cannot be overstated, because it is an element of the material culture of society, as well as a factor in happy family life and family development. Housing and its quality clearly indicate the level of life.

18. Housing conditions have always exerted considerable effect on demographic processes in society, on family development, on household activities, recreation and medical care. Planning of housing, in its turn, is in strong interdependence with demographic processes, especially concerning any regularities of family development.

19. A tremendous housing construction project is under way in the Soviet Union. During the period of Soviet Power, more than 2.6 thousand million m² of surface area were brought into occupancy in the Soviet Union. The total urban housing inventory has increased fourfold, as compared with 1940, and was about 1.7 thousand million m² at the end of 1972.

20. The period from 1961 to 1972 saw the highest housing construction rates, which enabled 132 million persons, or more than half the population of the country, to improve their living conditions or to have their own dwellings built. As a result of this, more than 100 million people enjoyed house-warmings. [1]

21. The Five-Year Development Plan of the USSR envisages a total volume of housing construction of 580 million m² in the five years from 1971 to 1975. The average dwelling space per urban inhabitant, which was 11 m² in 1970, will increase up to 11.9 m² in 1975.

22. Both urban and rural residents in the Soviet Union enjoy various privileges as concerns housing expenditures. Total outlays for rent and utilities (water supply, sewerage, central heating, electricity, gas supply etc.), on average, do not exceed 4 per cent of the total expenditures. Before the Revolution, rent alone accounted for 20 per cent or more of the total outlay of the family budget of working people.

23. Housing problems in the USSR would have been solved long ago had there been no devastating damages inflicted by the Nazi invaders during the Second World War, which destroyed 1,710 towns and settlements and left 25 million people homeless in the areas temporarily occupied by the Nazis.

24. Changes in a family's size and structure are closely interrelated with its well-being and with the right and actual possibility of all able-bodied family members to be gainfully employed. Of great importance also is the provision of old-age pensions guaranteed by the State. Well-being in the Soviet Union is based not on private ownership of the means of production, with the related pattern of distribution and inadequate relations of production, but on incomes produced by people actively engaged in the socialist production processes.

25. The continuous improvement of the well-being of the people of the USSR is an objective economic law of the socialist society. This law finds its implementation in the growth of national income, which is used for further development of production and for the improvement of well-being. The national income of the Soviet people increased 51 times by 1972, as compared with the pre-revolutionary period and it totalled 315.3 thousand million roubles. For more recent periods, say for the 12 years from 1961 to 1972, an even more evident increase took place equal to an increase of 2.2 times.

26. In a socialist society, increases in national wealth are actually reflected in the improvement of the well-being of each family. Having this in view, about three fourths of the national income is used for consumption, that is, for the meeting of the personal requirements of the population, while one fourth is spent for the expansion of the country's productive capacity with the objective of raising the level of living of the population.

27. In the Soviet Union, radical changes have taken place in the structure of the population according to the means of subsistence, which is testified to by the data acquired through population surveys.

28. As is seen from table 2, persons having employment account for nearly half of the total population of the USSR. Those employed include workers and employees of state, co-operative and public organizations, as well as collective farmers employed in agricultural production.

29. In the Soviet Union, there are no unemployed persons. Every citizen of the Soviet Union has a right to guaranteed work. The right to work is ensured by the Constitution of the Union of Soviet Socialist Republics. The right of every citizen of socialist society, together with his duty, to work is one of the basic foundations of socialism.

30. A successful solution to the unemployment problem in the Soviet Union paved the way for a further increase in well-being. Real incomes of workers have increased 8.5 times in 1972 as compared with 1913, while real incomes of peasants have increased 12 times during the same period. Even for a more recent time-span, the same trend is evident: real *per capita* incomes have increased, 1972 as against 1940, 4.3 times. [2]

31. The main source of the livelihood of workers and employees is wages and salary, while a guaranteed payment, both of cash and in kind, is used as remuneration for the labour of collective farmers. Apart from individual wages and salaries, considerable sums are spent from social consumption funds in the form of various allowances and grants. This should be borne in mind when considering the distribution of national income. From these funds, the population is provided with free education and training to improve professional skill, free medical care, allowances for temporary disability, pensions, scholarships for students, paid annual leaves, free and reduced-price accommodation in sanatoriums and holiday homes, maintenance of kindergartens and day nurseries, as well as a number of other allowances and grants.

[1] *SSSR v Tsifrakh v 1972 Godu, Kratkii Statisticheskii Sbornik* (Moscow, Izdatel'stvo "Statistika", 1973), p. 177.

[2] *Ibid.*, pp. 172 and 174.

TABLE 2 DISTRIBUTION OF THE POPULATION OF THE USSR ACCORDING TO MEANS OF SUBSISTENCE

	1959		1970	
	Population (millions)	*Share (percentage)*	*Population (millions)*	*Share (percentage)*
Total population	208 8	100 0	241 4	100 0
Gainfully employed	99 1	47.5	115 2	47.7
Members of families of collective farmers, workers and employees engaged in personal subsidiary plots	9 9	4 7	1.8	0 8
Persons in receipt of State assistance (pensioners and others)	12 4	6 0	32.7[a]	13 5
Fellowship holders	1 7	0 8	3 5	1 5
Dependents of individual persons	85 4	40 9	87 9	36 4
Self-supporting persons having sufficient means for their subsistence	0 3	0 1	0 3	0 1

SOURCE: *Vestnik Statistiki*, No 3 (1973), pp 82-86

[a] As of the beginning of 1970, the total number of pensioners had reached 40 1 million persons Only those were defined as pensioners, during population surveys, whose main source of subsistence was a pension Those pensioners employed full-time were recorded as gainfully employed In early 1973, the total number of pension-holders was estimated to be 43 million persons

32 In 1972, there was an increase in social consumption funds which topped 72 thousand million roubles *Per capita* consumption was estimated to be 300 roubles, including allowances and grants; average consumption from these funds per average family was over 1,100 roubles per annum. Currently, disbursements from social funds cover almost one fourth of the total aggregate family income

33 Social consumption funds serve best to indicate the level of living inherent in socialist society This additional and significant source of income plays an increasing role in family incomes, which may be clearly seen from the data obtained through family budget surveys, as shown in table 3

34 Family development and changes in the structure of families are greatly influenced by the role women play in society. The Great October Revolution of 1917 swept away all traces of women's inequality and, without exception, has freed women from exploitation and oppression. Extremely striking were the developments after the Revolution which took place in the eastern regions of the country and completely transformed women's role in local society The women of the eastern peoples were all, with rare exceptions, illiterate and entirely dependent upon their men, although women's labour played a big role in the economies of these peoples

35. One of the first decrees issued after the Revolution established equal rights for women and put an end to all kinds of women's inequality with men. As V I Lenin put it, during a short period of two years, Soviet Power, established in one of the most backward regions of Europe, has accomplished as much in providing women equal rights with their "strong half" as all advanced, progressive, "democratic" republics in the world have hesitantly managed to have achieved during a 130-year span of time.

36. Women in the Soviet Union have equal rights with men as concerns pay, professional skill and education Equal rights of women and men are not merely

TABLE 3. INCOME STRUCTURE OF FAMILIES OF INDUSTRIAL WORKERS

(Percentages)

	1922	*1940*	*1960*	*1971*
Total aggregate income including:	100	100	100	100
Wages of family members	87 7	78 5	75 2	74 2
Pensions, scholarships, allowances and other disbursements from social consumption funds	2 0	15.3	20 4	22 4
Other income	10 3	6 2	4 4	3 4

SOURCE: *Vestnik Statistiki*, No 12 (1972), p 47.

proclaimed by law, but are correspondingly implemented through a number of socio-economic measures providing for emancipation and equality, as laid down by law.

37. Women in the Soviet Union successfully occupy very important posts in all branches of the economy of the Soviet Union, in science and culture. In 1971, women accounted for 51 per cent of total employment, amounting to 47.3 million persons, as compared with 2.8 million women employed in the economy in 1928, or 24 per cent of the total manpower of that time.

38. Women play an important role in public health and education, which favourably influences health and educational progress, because of women's unique ability to combine both skill and professional experience with female charm and sincere efforts to protect and better raise children, as well as to care for other people's health.

39. Women currently employed as manual and non-manual workers in industry account for 48 per cent of the total manpower, in agriculture, for 45 per cent, in trade and public catering, for 76 per cent, in science and related services, for 48 per cent, and in general management, for 62 per cent of the total number employed. All male and female workers are equally paid in the Soviet Union for the same quantity and quality of work.

40. In the pre-revolutionary period, 55 per cent of all women employed worked as servants of the capitalists, landowners and merchants, 25 per cent of the women employed worked as farm hands on land owners' and kulaks' estates, thus leaving only 13 per cent of employed women for industry and construction and a mere 4 per cent for education and health.

41. The employment status of women, to a certain degree, has an impact on their role in family life, where women bear the main share of household duties, to say nothing of their specific functions as mothers. Needless to say, an employed woman is rather limited in her time to raise children and to perform household duties.

42. The existing contradiction between a woman's employment and her family and household duties in the Soviet Union is being gradually eliminated by means of the following:

(a) A broader network of pre-school facilities, including kindergartens and nurseries; schools providing for children's stay after classes and their meals, as well as home-assignment-preparation after class; and specialized boarding-schools. Mention should be made also of non-school related children's facilities: children's camps, club-houses and the like;

(b) A rational distribution of household duties among all family members;

(c) A wider usage of home-oriented appliances, such as refrigerators, laundry-machines, cleaners and polishers;

(d) A broader system of public catering, trading centres, especially those with canned goods, as well as other foods obtained in prepared form; various services could be added to the list.

43. The solution of these problems, along with the full implementation of equal legal rights of women and men in all branches of social life, enable women successfully to combine occupational activities in social production with household duties.

44. An extremely short historical period saw the transformation of a backward country into a universally literate State. The Constitution of the Soviet Union provides women with guaranteed legal rights to education. The All-Union Census of Population of 1970 testified to complete female literacy, as compared with 37 per cent of literate women in 1920. In Tsarist Russia, literacy covered about 8.3 per cent of the total number of women. The level of literacy in the country was almost four times lower than that of urban areas. Women inhabitants of the northern areas, Central Asia and other "border" territories of Tsarist Russia were, but for rare exceptions, illiterate.

45. The share of women with higher and intermediate specialized education is currently increasing more rapidly than that of men, while among employed women, the number with higher or intermediate specialized education is practically equal to that of males. This fact is clearly illustrated by the census data given in table 4.

TABLE 4. UNION OF SOVIET SOCIALIST REPUBLICS: EDUCATIONAL ATTAINMENT OF MEN AND WOMEN

Year	Educational attainment per 1,000 persons (men or women): Higher and intermediate specialized education — Men	Women	Persons with higher education — Men	Women
	Total population aged 10 and over			
1939	127	90	11	5
1970	522	452	48	37
1972	547	478	53	41
	Employed persons			
1939	136	104	16	9
1970	654	651	68	62
1972	698	697	78	71

46. The number of women with higher education had, by 1970, increased 8.2 times, as compared with 1939; while for women with intermediate specialized education, an increase of 5.1 times for the same period took place. The increase of men with higher education in 1970 compared with 1939 was 4.8 times, while for men with intermediate specialized education it equaled 4.3 times. As the census data indicate, the number of women with higher or intermediate specialized education has increased, in 1970 as compared with 1939, in the Turkmen Soviet Socialist Republic nine times, in the Uzbek Soviet Socialist Republic 10 times, in the *Kirghiz Soviet Socialist Republic 12 times*, and in the Tadzhik Soviet Socialist Republic 15 times. Suffice it

to say that the corresponding rate of increase for the entire Soviet Union for the same period was five times.[3]

47. Approximately 390,000 women in the Soviet Union are engaged in scientific work, including 3,500 women with academic degrees of doctor of science and 68,000 with academic degrees of candidate of science. Of the total number of scientific workers, about 2,000 women have the academic rank of academician, active member or corresponding member of the Academy or professor.

48 Radical changes in the social status of women in socialist society have raised women to top positions in the State In Tsarist Russia, women were deprived of election rights. Today, women not only fully enjoy equal voting rights with men, but are themselves elected to hold various government posts In 1972, there were 463 women deputies in the Supreme Soviet of the USSR, *comprising 31 per cent of the total number of* deputies, and 36 per cent of the total in the Supreme Soviets of the Union Republics were women More than 992,000 women are deputies of local Soviets

49 One of major family functions is its raising of children Women play a leading role in performing this function, which is naturally predetermined by their status as mother and by their social status in society In the Soviet Union, mothers are treated with esteem and respect and are cared for by the State Women who are engaged in social production are provided with annual paid leave Additional fully paid maternity leave is provided for periods up to four months following childbirth A wide network exists of mother and child care designed to provide all possible protection of the mother's health Medical care in the Soviet Union, being free, naturally covers all women in the country.

50 The Soviet State pays great attention to family maintenance and the rearing of children by a wide-range system of grants and allowances In 1971, more than 3 million mothers received monthly state allowances for children Nearly 400,000 mothers with two children were given one-time grants following the birth of the third child Of great significance in this respect is the introduction of a system of state allowances for families with relatively low levels of *per capita* income. This project is to be implemented in accordance with the Five-Year Plan of Development of the National Economy of the USSR for 1971-1975

51 Children's pre-school establishments—kindergartens and nurseries—are of paramount importance for children's care and upbringing In 1971, nearly 10 million children were covered by these establishments; taken together with seasonal pre-school camps and other camps, the number increased, covering about 15 million children

52. Almost 440 roubles are spent annually on keeping one child in nursery, with parents paying only *18 per cent of this sum* With kindergartens, the figures are, correspondingly, 400 roubles annually per child, with 26 per cent paid by the parents The remainder is covered from social consumption funds.

53. Worth mentioning is a new educational approach implemented in pre-school children's establishments, according to which a closer link is provided with the subsequent school teaching Children are taught many subjects related to practical everyday activities, which enable them to have a deeper insight into life and to create new relations with their parents, among the family and with the school and the like These new relations and attitudes help to enrich a child's outlook and generate new moral perceptions, contributing, thereafter, to more responsible decision-making, useful for both individual and social needs

54 Family size and family structure are directly influenced by birth rate, which is, in turn, affected by a series of socio-economic factors partially considered above. In this connexion, it should be mentioned that the socio-economic impact on birth rate was duly considered in a Soviet paper prepared for the Symposium on Population and Development, held at Cairo, 4-14 June 1973, "The interrelationships between development and population in the developing countries",[4] related to problems of population and development.

55 The total population in the Soviet Union, in early 1973, was 248 6 million, including 115 million men and 133 6 million women As is well known, this country experienced heavy losses during two world wars, having lost over 20 million in the Second World War alone The Soviet Union, nevertheless, has retained a rather stable population increase

56 During the period from 1926 to 1972, the crude birth-rate in the Soviet Union decreased from 44.0 to 17 9 per 1,000 This birth-rate decline was caused by a number of socio-economic factors A sample survey was conducted in the USSR in 1969, with the aim of better knowing public opinion on the optimal and expected number of children in a family As was disclosed during the survey, the overwhelming majority of women queried on that point (more than 80 per cent) were strongly in favour of having an "ideal" family of from two to three children This is, however, an average for the entire country. An average "ideal" number of children desired in a family may change from one area to another. Thus, in the Ukrainian Soviet Socialist Republic, the women queried responded with an average of 2 6; in the Byelorussian Soviet Socialist Republic, 2 9 ; while in the Uzbek Soviet Socialist Republic the figure was 4 6 The average for the entire country was 2.9.

57. The expected number of children frequently turned out to be less than the "ideal" number, which may be best illustrated by the following example covering the above-mentioned Union Republics

[3] "Zhenshchiny v SSSR", *Vestnik Statistiki*, No 1 (1973), p 81

[4] E/CONF 60/SYM 1/35

58. As is clearly seen from table 5, the expected number of children considerably deviates from the "ideal" number of children in family. This difference is caused by a complex of social, economic, cultural and other factors.

TABLE 5. [illegible] "IDEAL" AND EXPECTED NUMBER OF CHILDREN IN FAMILIES

	Average number of children			
	[illegible]	[illegible]	[illegible]	[illegible]
"Ideal" number of children	[illegible]	[illegible]	[illegible]	[illegible]
Expected number of children	2.4	2.1	2.4	[illegible]

Source: [illegible]

59. It has been mentioned above that a considerable birth-rate decline is taking place, as compared with the pre-revolutionary period. While an even more considerable mortality decrease, which was 29.1 per cent in 1917 and 8.6 per cent in 1972, took place, it was not accompanied by a sharp fall in the crude birth rate, and thus led to steady population increase.

60. The Soviet State strongly favours population increase, because *in a progressing socialist economy it is one of the most important factors in the increase of national wealth and in the raising of the level of living.* The economic development of the USSR is the best evidence of this fact. By 1972, *the total population of the country had increased by 56 per cent, as compared with 1913; fixed assets production in all branches of the economy increased 23 times during the same period, industrial production increased 105 times, gross agricultural production three times and national income 31 times.*

61. It would be appropriate to mention that, if it had not been for the wars, the economic development of this country would have been even more striking.

62. The conclusion, thus, may be drawn that the socialist way of economic development is a safeguard of a higher rate of production of material goods and services in society, which by far exceeds the rate of population increase. The socialist way of development also guarantees a continuous raising of the well-being of people and the meeting of their cultural needs, exerts a decisive impact on family development based on equal rights of men and women and helps to combine harmoniously individual and collective needs.

POPULATION POLICY AND THE FAMILY: THE LATIN AMERICAN CASE *

Centro Latinoamericano de Demografía **

POPULATION POLICIES AND THE FAMILY SOME BASIC CONCEPTS

Towards a definition

1. There has been a great deal of discussion in Latin America about a definition of "population policies". This can be explained by the complexity and ambiguity of the field more than by a Byzantine eagerness for conceptual perfectionism The following considerations attempt to clarify this problem and to establish the minimal conceptual basis necessary to the development of our subject

2. The majority of the proposed definitions have *an evident normative character, which is to express* what, in their authors' opinion, a population policy should be Even though these propositions do not coincide in all their aspects, they contain certain basic common elements that can be conveniently outlined as follows.

(*a*) For a population policy to exist, it must pass from a passive attitude, in which population phenomena are considered as parameters, to an active attitude, in which the possibility of exerting influence or control over population variables is established;

(*b*) The variables which that policy is intended to influence ultimately are the volume, growth, structure, mobility and the geographical distribution of the population,

(*c*) A population policy is based on decisions adopted by the public sector.

3. From a normative point of view, there is general agreement that the objectives of a population policy and the means chosen to implement them should be coherent with the goals and objectives of economic and social development and subject to them This is the reason why—it is said—a population policy should be *formulated in the context of global planning.*

4. In practice, the identifiable population policies usually do not fulfil this last requirement because there is no global development policy, because the planning organisms do not exist, or because when both exist the decisions destined to influence demographic behaviour are taken from a purely sectoral perspective (for example, as a component of health policy)

5 The three basic elements on which there appears to be consensus permits one to construct an operational definition in the following terms· population policy in a country exists when the public sector adopts decisions deliberately designed to influence demographic variables, whether as their principal effect or as a foreseen side-effect

6. An even wider definition could be as follows population policy exists when the public sector (or government) considers population variables from the point of view of their eventual control An even stricter one than the preceding would be "when the public sector adopts decisions and implements and carries *them out*"

7 In this series of definitions, more or less exacting, the deliberate character of the decisions is emphasized —which is, of course, inherent in the very concept of policy—thus excluding the so-called "implicit population policies" that appear to be more appropriately called simply "demographic effects (unforeseen) of economic and social policies" It is evident that policies which directly or indirectly produce demographic effects have existed and will always exist, but it is only correct to speak of population policies when the demographic effects are foreseen and desired or, at least, accepted by the political actors

Stages in the formulation of a population policy

8. A population policy thus defined involves at least four stages:

(*a*) Analysis of the problem,

(*b*) Formulation of a policy. taking decisions in order to influence (or not to influence) demographic variables in the desired manner, which implies fixing more or less precise goals and electing means;

(*c*) Implementation and enforcement,

(*d*) Evaluation

Analysis of the problem

9. It is usual to speak abstractly of "the population problem", which from a political point of view is practically useless. The simple intensity of a phenomenon (for example, high birth rate) does not constitute a problem in itself but to the extent that its impact upon economic and social variables makes it an obstacle to the accomplishment of determined objectives

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** Santiago, Chile

10. The analysis of the problem thus necessarily involves a certain conception—scientific or impressionistic—of the way the structure and dynamics of population influence economic, social and political structures and processes, thereby obstructing or facilitating the accomplishment of the proposed objectives for development.

11. Therefore, it can be affirmed that the manner of structuring a demographic phenomenon as a problem and its political significance will vary between one country and another, depending not only upon the objective situation, but upon the style or strategy of development adopted by each Government and the conception that the political actors may have of the role of demographic variables in the social, economic and political processes. Yet, according to how well or poorly integrated and extensive such a conception may be, there will be a tendency to formulate the problem as a whole or partially. In the latter case, the problem of the growth of the process of internal migration (spatial location, urban growth) is separated from that of international immigration and emigration. In practice, this is what usually occurs which is why it is more appropriate to speak of population problems and policies than of "the problem and the policy".

Policy formulation

12. With regard to this, it is necessary to mention at least two basic considerations.

13. First, because of the very nature of the variables one desires to modify, the specific goals of a population policy cannot be considered valuable in themselves. Any value these specific goals may possess arises from their connexion with the objectives of development. Thus, it is possible to maintain that the objectives intended to direct and justify a given population policy are economic, social or political, but by no means demographic. That is why the desired decrease of fertility in certain cases is sought not for itself, but because it is expected to reduce the rate of increase in the demand for services or to raise the level of family life, or to diminish pressures upon the political system etc. This apparently obvious affirmation has great importance as it establishes a clear difference between the population policy and other policies, such as health, education, employment, social security or housing, which can be instrumental in reaching broader objectives, but are oriented towards goals considered valuable in themselves. This fact justifies the relative autonomy of these policies in relation to a general development policy and, as its counterpart, justifies the subordination of an eventual population policy to that general policy.

14. Secondly, it is pertinent to point out that though the goals of a population policy may be precise and specific (for example, to reduce the birth rate from b_1 to b_2 in t years), thus clearly distinguishing it from other policies, the means that can be used are so varied that the population policy will be intertwined with other specific policies because of the necessity of acting through them. This dependence is particularly intense when one attempts to modify reproductive behaviour, which is obvious if one reviews the multiple factors on which it apparently depends, such as marriage laws (which influence the age of marriage eligibility); social security systems (which reward or punish large families); programmes for maternal health (which facilitate contraceptive practice); educational and employment systems (which establish the economic significance of the child and affect women's participation in the labour force etc.).

15. Therefore, it can be maintained that, because of the very nature of variables involved, a population policy necessarily interacts and is expressed concretely through other sectoral policies (health, education, industrialization, agrarian policies etc.).

Family policy and population policy

16. The preceding discussion can be fully applied to the relations that should exist between a family policy and a population policy. The central objective of the former can be formulated as the creation of the most favourable conditions for the establishment and adequate functioning of families in accordance with the function and specific role assigned them by each society. It is evident that, universally, one of these functions is procreation, whose regulation by the couple through family planning constitutes a value in itself, a duty and a right that currently no one discusses.

17. Similarly, there is agreement that responsible parenthood is not limited to birth control, but is expressed as well and principally in the care, feeding, education and socialization of the children. Consequently, family planning programmes should be considered one among multiple instruments used by a family policy intended to enable and motivate the couple to exercise a responsible parenthood. The existence of education and services devoted to family planning is thus fully justified as a tool of family policy, regardless of whether a population policy already exists and whatever its goals may be.

18. These policies can be complementary or in conflict. Conflict arises in some cases when the demographic effect resulting from the eventual implementation of the family planning programme is considered in opposition to what the Government desires. This is the case in Argentina, where for a long time there has existed strong resistance, based on a pro-natalist attitude toward official development of such programmes. In other cases, the conflict may arise at an ethical level when, in order to raise the demographic efficiency of the family planning programmes, proceedings that are contrary to the principles and values that shape the family policy are adopted.

19. These types of conflict can also be present in other specific policies to the extent that the demographic changes that may be foreseen as a lateral effect of their application do not have the meaning or intensity appropriate to the adopted population goals.

Population policy and general development policy

20. As was pointed out in paragraph 3, there is agreement that population policies should be consistent with the goals and objectives of economic and social development and subordinate to them This proposition could be applied equally to any other particular policy, but is specially important in the case of population policies because at the same time that it gives them meaning it is essential for their rationality and effectiveness The remainder of this paper is devoted to this latter aspect, especially referring to those population policies that affect and are affected by family dynamics and structure, that is, those attempting to influence reproductive behaviour.

21. The relation of population policy and the general development policy can be specified for the levels mentioned in paragraph 8. analysis of the problem, policy formulation, implementation and evaluation

22. Thus far, the prevailing tendency has been to discuss population problems considering mainly or exclusively the effects of demographic factors on political, economic and social structures and processes This perspective, though necessary, appears to be incomplete, as dynamic analysis of population problems within concrete societies should also include the study [illegible] this approach permits one to predict the probable course of demographic behaviour throughout time, thus establishing an important basis as much for the definition of the problem as for deciding on the desired direction of change and the goals that should orient an eventual population policy.

23 Therefore, the definition of the problem, as well as the formulation of a rational population policy, requires an answer to the following series of questions.

(a) *The analysis*. Which are the probable demographic effects of a determined economic and social policy *X* within a given historical context? To what extent is it going to affect differently the behaviour of different social sectors?

(b) *The problem*. Is the demographic behaviour that is expected to result from the application of that policy *X* favourable, indifferent or unfavourable to the achievement of the proposed objectives of development?

(c) *Objectives and goals*. Depending upon the answers to the previous questions, what should be the objectives and goals in a population policy that attempts to be an instrument of the adopted general development policy? Is it suited to reinforce or rather to counteract the demographic effects expected to result from the implementation of *X*, and in which social sectors?

(d) *Means*. Which are the changes to be effected in the proposed concrete programmes in *X*, in order that its demographic effects could be more closely [illegible] Which comple- [illegible] Which are the [illegible], cultural) for a chosen specific means to produce the desired effect? What is the political and administrative feasibility of the means (or programmes) adopted? What is the cultural and ethico-juridical acceptance of these means?

24. The scientific answer to these questions requires a theory of the interrelation of economic, social and political variables, on the one hand, and demographic variables, on the other hand, as well as a great deal of empirical research in this field. There are no answers of universal validity, and the answers vary not only as a function of the objective situations in each country, but according to the development policies adopted and the strategy chosen to implement them.

Factors of reproductive behaviour possible means of action

25 Reproductive behaviour, as all human behaviour, is the result of the interaction of many social factors of different kinds If it is to be modified in a given direction, one is faced with the problem of the most appropriate means to induce that change. This problem cannot be solved rationally without formulating a theoretical framework for the factors that determine or condition that behaviour and its interrelations. As the majority of the Latin American countries still maintain high rates of demographic growth, attention is centred upon those means which can be useful to induce a decrease in fertility

26 Two main types of changes in fertility can be distinguished the "major" changes, which have appeared in processes of demographic transition in various forms according to the different historical contexts in which they have occurred, and the "minor" changes, which are produced in different social sectors once the transition is over or within each of its stages Discussion is directed to the factors that account for those "major" changes and to the means that can be used to induce or accelerate them. In this section, there is first a brief examination of the process of demographic transition observed in developed countries in order to take advantage of that historical experience to then outline an analytical framework that distinguishes and organizes the factors that appear to determine or influence changes in fertility.

Demographic transition in developed countries

27. The processes of demographic transition experienced by developed countries began from a stage of high fertility with a predominant orientation towards relatively large families, sexual behaviour without habitual contraceptive practice and with the expectation and acceptance of pregnancy if it resulted. Ultimately, the process has reached a stage of low fertility resulting principally from orientation towards a small family

achieved through sexual behaviour characterized by habitual contraceptive practice or by resort to abortion as an anticipated solution.

28. It should be pointed out that there were no important technological advances in the field of contraception during this process and that control of reproductive behaviour was achieved despite the primitiveness and insecurity of the methods used. One could thus conclude that the emergence of this new pattern basically followed a change in motivation from an orientation towards large families to an orientation towards small families.

29. This change in motivation appears to have responded to a change in family structure resulting in turn from important changes in the economic-social context. These changes, beginning with an initial economic-social structure in which high fertility is functional for the family, ended with a structure in which low fertility is functional.

30. In the initial structure, the cost of an additional child is small compared with his contribution through early incorporation in work and his participation in the domestic economy; the wide net of family relations was an important factor of security and of social and economic power, the children caring for and protecting their parents in old age etc. The family fulfilled a series of economic and social functions mainly through the woman, whose domestic work was considered consistent with the requirements of her role as a mother.

31. In contrast, in the final structure, economic and social factors are such that a reduced number of children becomes more functional than a large number for the satisfaction of family needs and the couple's expectations. This type of structure is characterized by (among other features) a high degree of industrialization, urbanization and urban concentration; the growing influence of urban culture on rural areas; universal primary education; the transfer of a great part of the traditional family's socio-economic function to extra-familial institutions; the tendency to lessen the difference in sex roles, with an increasing participation of women in extra-domestic work, in professional training and in political, union, artistic, athletic and other types of organizations. In these circumstances, the cost of an additional child is high, the quality rather than the quantity of the children (education, professional training etc.) is important and the social utility of the net of family relations is diminished.

32. Undoubtedly, the decline of mortality played an important role in the transition, especially as it permitted the same final family size to be achieved with a lower rate of fertility. Nevertheless, the decisive factor for the beginning of a generalized reduction in fertility seems to have been the change in the socio-economic structures which led to a reformulation of reproductive behaviour patterns, with a period of transition and adjustment.

33. It would be simplistic to believe that the developing countries must undergo the same process of socio-economic change experienced by the developed countries in order to produce an orientation towards a small family and a practice of controlled reproductive behaviour, for at least theoretically it is possible to imagine other societal models that would lead to this kind of reproductive behaviour. What it does appear legitimate to conclude is that demographic transition to a great extent appears to be the result of important changes in the socio-economic structure and that this aspect cannot be left out of the discussion of the means to induce or accelerate the transition in specific societies.

Factors of reproductive behaviour

34. Based on the preceding general considerations, the following analytical framework is proposed, in which the discussion of instruments of action is placed.

35. The change in fertility implies two complementary elements—fertility goals (orientation towards a small family) and means to achieve them (contraceptive practice, including sterilization and abortion)—as shown in the figure given below. The significance of the figure is explained below.

Factors influencing fertility goals

36. The factors influencing fertility goals are as follows:

(a) *Structural factors at a macro-level:* elements or characteristics of socio-economic structures conditioning the family structure that determine the most functional number of children for that family. Among these factors are:

(i) in the economic structure: forms of ownership of the means of production and land tenure; types of enterprises; structure of labour force demand (in particular, job opportunities for women); forms and levels of remuneration; labour stability, etc.;

(ii) permeability of social stratification, with the corresponding mechanisms and expectations for social mobility;

(iii) educational system: costs, access, length of obligatory education, possibilities of technical training for women etc.;

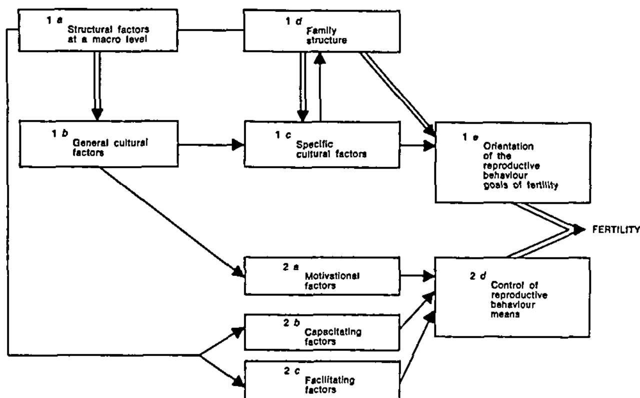
(iv) social security system: access to health services, family lending services, protection in old age, etc.

(b) *General cultural factors:* principally the traditional or modern character of the system of values and norms;

(c) *Specific cultural factors:* beliefs, values and norms referring to family size, functions, and the roles of its members, particularly the children;

(d) *Family structure:* functions fulfilled by the family and the system of roles organizing the activity and interaction of its members;

(e) *Orientation towards reproductive behaviour:* within the proposed framework, the orientation of reproductive behaviour towards a small or large family will depend principally upon the type of family struc-



ture (1 *d*) and secondarily on specific cultural factors (1 *c*). In other words, it is assumed that orientation of reproductive behaviour depends upon the significance of the children (quality *versus* quantity, differential significance according to sex etc.) to the development of family life and the satisfaction of the couple's needs, which in turn depends upon family structure. It is also assumed that family structure depends principally upon structural factors at the macro-social level (1 *c*), and only secondarily on cultural factors (1 *b*).

37. The level and form of insertion of a family unit, or of a group of family units corresponding to a social sector, in the socio-economic structure results in a particular configuration of these economic and social factors which condition the family macro-structure. The greater the internal heterogeneity of the macro-structure, the more differentiated the configurations of socio-economic factors that result from different levels and forms of insertion of the units in the structure. This, in turn, generates different types of family structure, especially with regard to forms of participation by the man, the woman and the children in extra- and intra-family economic activity

Factors influencing means towards a controlled reproductive behaviour

38. The factors influencing means towards a controlled reproductive behaviour are as follows:

(a) *Motivational factors.* These factors condition the acceptability of techniques and can be cultural (opposition to the use of contraceptives for moral reasons, resistance to methods involving handling of the genitals by a physician) or of widespread practical judgement (low efficiency, fear that a method may produce illness etc.);

(b) *Capacitating factors* These factors are related to information on the existence of methods and techniques and to the aptitude and training of people for their use;

(c) *Facilitating factors.* These factors have to do with the development of technology (contraceptive methods, abortion techniques etc.) and with the availability and access to that technology.

Means of action

39. To date, the most frequently used means to induce a decline in fertility have been family planning programmes Together with these, some measures have been taken to liberalize legislation on abortion and to facilitate its practice. These programmes act basically at the level of facilitation (2 *c*), and capacitation (2 *b*), for controlled reproductive behaviour. In many cases there are attempts to reinforce them through propaganda and education designed to introduce the norm of a small family. Thus, the intention is to induce a cultural change by acting directly on the contents of culture.

40 At a motivational level (2 *a*), means to increase the acceptance of the method have been proposed by various authors [1] and adopted in some programmes, as

[1] See B Berelson, "Beyond family planning", *Studies i Family Planning*, No 38 (February 1969).

in India, for example, where men have been given economic incentives to accept vasectomy. The imagination of some authors has been working feverishly at this level, inventing innumerable possible means, in many cases of a coercive nature. An example of this is a proposed law forbidding each couple to have more than two children; adherence would be ensured by an obligatory temporary sterilization for everyone, which would be suspended only between marriage and the birth of the second child.[2] Others have proposed obligatory sterilization after the third child, or compulsory abortion. The efficiency of these different measures may vary greatly according to the characteristics inherent in the groups or social sectors to be influenced.

41. If the use of coercive measures—the ethico-legal acceptability and political feasibility of which appear to be very low, at least in Latin America—is excluded, it can be argued that the efficiency of family planning programmes will greatly depend upon their response to a demand to a need to limit family size.

42. If the theoretical propositions mentioned above are accepted, this felt need to limit the size of the family will depend to a large extent upon the characteristics of the configuration of economic and social factors resulting from their particular form of insertion in the macro-structure. Thus, if there endures a configuration in which a relatively large number of children is functional for the satisfaction of the needs of the couple or of the family in general, the acceptance of the programme can be expected to be low. Even though family planning were to be accepted, contraceptive practice would only be casual or sporadic, without producing a significant decline of fertility.

43. The same can be expected of those measures destined to induce directly the change in cultural norms and values through propaganda. As long as having many children continues to be convenient for the couple, the cultural norms favourable to a high fertility will continue to be functional and for that very reason will show a high resistance to change. When, on the contrary, changes have already been produced at a structural level making a small family more functional than a large one, but norms favourable to a large family continue to be culturally valid, the predisposition toward cultural change can be expected to be greater (given the nonfunctional character of the norms) and therefore the efficiency of propaganda and education intended to modify them could be greater as well.

44. The use of direct incentives raises another type of problem. The appearance and generalization of a controlled reproductive behaviour pattern, oriented towards a small family, appears to require as a necessity an appropriate socio-economic configuration. If this structural condition is not met, the changes in behaviour resulting from direct motivation of the individual through incentives will probably be only changes in aggregations of individuals without impact at cultural level. This will mean, therefore, that the possibility of such changes in a pattern of behaviour being spread and being transmitted from one generation to another will not be brought about. Thus, they would be exogenous actions incapable of producing a self-sustaining effect. On the contrary, if structural conditions favourable to a change in the reproductive behaviour are produced, direct incentives can effectively contribute to begin and accelerate the process of change, counteracting at the motivational level underlying culturally based resistance.

45. Concerning coercive measures (for example, prohibition of having more than x children, together with sterilization and/or compulsory abortion), their efficiency will depend upon the coercive capability of the authorities. However, they present serious problems from the point of view of their ethico-legal and cultural acceptability and political and administrative feasibility.

46. This short discussion of the means that can be used to implement a policy oriented towards reducing fertility can be summarized in the following propositions:

(*a*) Inducement of reduction in fertility supposes as a necessary condition the creation of structural conditions that make a small number of children more functional than a large number for the satisfaction of family needs;

(*b*) Given that the change in cultural factors is often a delayed effect of change at a structural level, situations are produced in which the effectiveness of facilitating and capacitating actions towards controlled reproductive behaviour are hindered mainly by culturally based resistance. In these cases, the process of generalized adoption of the new type of behaviour can be accelerated through means acting at the cultural level, such as propaganda and education;

(*c*) In specific circumstances, direct incentives can favour and accelerate the adoption of controlled reproductive behaviour, but they do not appear capable of inducing by themselves a stable generalized change that registers at the level of cultural norms and values;

(*d*) The creation of structural conditions favourable to a change in reproductive behaviour depends upon the course followed by its conditioning factors at a macro-structure level. This course depends, in turn, upon the action on these factors through economic and social policies. This is why consideration of the probable demographic effects of economic and social policies should become an element in the formulation of population policy and the basis for its insertion within general development policy.

The social context: major lines of social change in Latin America

47. This is not the place to give a detailed version of the changes that have been taking place in Latin America and that influence the family and its repro-

[2] E. R. Chasteen, *The Case for Compulsory Birth Control* (Englewood Cliffs, New Jersey, Prentice-Hall, Inc., 1971).

ductive behaviour. However, it is necessary to point out at least their major lines, since the society they help to form constitutes the context in which the family is found, a context without which it is difficult to make an analysis of the role of public policies in demographic change.

48. The main point to be stressed here is that the countries of the continent show, in different degrees, an increasing structural heterogeneity, regional as well as sectoral and in social stratification. This heterogeneity is manifest in the presence within the boundaries of a country of groups with characteristics similar to those found in countries economically more advanced, while other groups still cling to traditional patterns of life. In other words, it is emphasized that the problems that various authors have attempted to explain through the concepts of "marginality", "internal colonialism", "dependency" and "structural heterogeneity" cannot be left aside when one tries to analyse the family and its reproductive behaviour in Latin America

49. The existence of an internal polarization is not a new phenomenon in Latin America, but its character has changed through time due to the double influence of the changing internal structure and the way in which national economies stand in the world economic market Thus, while the countries of Latin America based their economy on agriculture and on exportation of some raw materials, the foci of development were constituted in those places and regions where such activities were carried out and in the cities that served them as centres of administration. As is well known, this situation changed when, due to the great depression, the political *élites* of some of the countries of greater relative development in the continent began to evolve a new style of development based on import-substituting industrialization. It was then that the heterogeneity began to acquire its more defining characteristics

50 At first, that industrialization was centred upon the production of consumer goods, which naturally led to the establishment of factories in or around the more populated cities. The new job opportunities created by the installation of these factories drew manpower from the countryside and smaller cities to these centres To this must be added the deterioration that the agricultural sector began to suffer due to an archaic land-tenure system, the subordinate role it began to play in the plans of the various Governments and the consequent drop of public and private investment in the sector. This situation, added to the rapid growth of the rural population, increased the surplus of agricultural manpower The consequence of both processes is that urbanization acquired an accelerated pace as is shown by the fact that the urbanization rate of the continent increased from 1.26 for the decade 1920-1930 to 2.5 for the decade 1950-1960 [3]

51. This process of accelerated urbanization has, in turn, resulted in the concentration of the population in a few comparatively large cities, if not in only one. This tendency, according to some sources, has increased instead of diminished in the great majority of the Latin American countries [4]

52. The tendencies described above lead to two different types of heterogeneities or polarizations: the urban-rural and the interurban. As a consequence, the economic, administrative, social, political and cultural infrastructure of the countries of the continent are concentrated in a few cities.

53. Intra-urban imbalances must be added to these polarizations The emergence of manufacturing as an internally important sector increases the complexity of the urban social stratification. The changes expected by the experience of the more advanced countries (emergence of urban managers as an economically important group, enlargement of the "middle sectors", emergence of an industrial proletariat) are joined by others which give the Latin American urban social structure its specific characteristics In general, they are related to what Raúl Prebisch has called "the spurious absorption of manpower" or dynamic insufficiency of the Latin American economy,[5] that is to say, the incapacity experienced by the economies of the countries of the region to supply steady employment to the available labour force

54 More specifically, there are two main tendencies that the specialists mention in this respect On the one hand, it is pointed out that the economic structure presents deep internal heterogeneities, both in sectoral productivity and in the degree of concentration found within each sector Firms and sectors using advanced technology based on an intensive use of capital coexist with other comparatively primitive firms and sectors and with others of an intermediate development. On the other hand, and directly derived from the latter, there are deep intra- and intersectoral differences in capacity to absorb the labour force, the most modern enterprises showing the greatest incapacity in this respect [6]

55 Structural heterogeneity has helped to produce the subcultural or institutional differences which to a

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[3] M Villa, *América Latina Algunas consideraciones demográficas del proceso de metropolitacion, 1900-1960*, Series C, No 122 (Santiago, Centro Latinoamericano de Demografía)

[4] See J. C Elizaga, "Migración interna, migración y movilidad, el proceso de urbanización", in *Actas de la Conferencia Regional Latinoamericana de Población* (México, 1970), vol 1, p 497.

[5] R Prebisch, *Transformación y desarrollo*, "La gran tarea de América Latina (Santiago, Chile), 1970

[6] In a study on the subject, it is pointed out that the modern economic sector of Latin America absorbs one eighth of the labour force while generating half the product The contrary occurs in the traditional sector, which accounts for one third of the employed population, though not generating more than [illegible]

greater or lesser degree are found in all Latin American countries. The countryside and the city, urban as well as rural classes and strata, the degree of technological development of the sector or firm where people work and different historical heritages, all contribute to produce distinct values, beliefs and norms. These factors have influenced the family and its reproductive behaviour.

56. Certain social sectors still present high fertility rates. These are the populous, working class, urban sectors and the sector of the peasantry linked to the *minifundio-latifundio* system (see para. 75). The reproductive behaviour of both sectors contrasts sharply with that shown by the urban middle classes, generally oriented towards a small family and where the practice of birth control has become habitual. They are, therefore, key sectors for an eventual demographic change.

Structural heterogeneity, key sectors for demographic change and population policies in Latin America

57. The increasing structural heterogeneity that has characterized the social and economic development processes in Latin American countries during the past 50 years has become apparent also in changes in reproductive behaviour. Whereas middle urban sectors, principal beneficiaries of the economic development and the expansion of services (education, health, social security) have experienced a gradual and sustained decrease in fertility, to the point of reaching levels quite similar to those of the developed countries, the great bulk of the rural population, left out of the principal benefits of development, still shows high levels of fertility and, in some cases, also of mortality. Within the urban context, it has been also possible to detect a remarkable contrast between the reproductive behaviour of the middle sectors and that of the populous working class sectors, which display levels of fertility very similar to those prevailing in the rural areas.

58. If a population policy, oriented towards decreasing the birth rate, is proposed, it appears evident that the key social sectors on which the action should concentrate are precisely those which maintain high levels of fertility. In other words, if the idea is to obtain an important slow-down in the growth pattern of the Latin American population, it is necessary to induce a change in the reproductive behaviour of the working class sectors, both in urban and in rural areas.

The urban context

The family structure of the urban working class

59. Thorough examination of these urban working-class sectors (which was possible thanks to several studies carried out during recent years [7]) shows that structural heterogeneity is also present within them, as determined by different positions within the economic sector. This appears to be the key factor for the differentiation of two family types: *the working-class or proletarian family* and *the marginal or subproletarian family*.

60. In general, these studies tend to agree that there are important differences relating to the type of occupation of the household head. In those families where the household head suffers permanent instability in his working performance, is underemployed and receives the lowest income on the scale, the studies have encountered the greatest number of unstable and consensual unions.

61. The insufficient income of the household head leads the mother and children to become involved in productive activities. [8] When the entire active female population is taken into account, one finds that women prefer to work outside the home and that married women or consensual partners participate less in economic activities than do spinsters, widows, or separated women. However, as concerns the type of marginal or subproletarian family under discussion, the preceding studies appear to demonstrate that this generalization is not applicable. Apparently, legal dispositions are operating to produce effects distinct from those desired. In this case, the regulations on pre- and post-natal leave would work as a break on hiring married women.

62. However, in the case of marginal families, studies have encountered a greater incidence of consensual unions, a situation generally not covered by the law, which makes it difficult for employers to calculate *a priori* the risk of pregnancy for the woman.

63. However, mothers within the urban marginal strata typically carry out activities not covered by social security or in contexts where it is easy to evade control by the authorities. Consequently, the legal arrangement that is apparently an obstacle would not affect the mother of an economically marginal household.

64. Participation by mothers in economic activities involves as a consequence a redefinition of authority

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[7] Among these studies, it is necessary to mention: J. Duque and E. Pastrana, *Las estrategias de supervivencia económica de las unidades familiares del sector popular urbano: Una investigación exploratoria*, Programa de Intercambio Escuela Latinoamericana de Sociologia (ELAS) CELADE (Santiago, January 1973); A. Gurrieri y otras, *Estudios sobre la juventud marginal latinoamericana* Santiago de Chile Editorial Universitaria; and Mexico City, Siglo XX, 1971), as well as H. Godoy and F. L. Lira, "Aspectos sociológicos de la familia en Chile", *Revista de Estudios Juridicos*, 1973; A. Mattelart and M. Mattelart, *Juventud chilena: Rebeldía y conformismo* (Santiago, Editorial Universitaria, 1970); P. Covarrubias and M. Muñoz, "Algunos factores que inciden en la participación laboral de las mujeres de estratos bajos", Instituto de Sociologia, Departmento de Trabajo y Organizaciones, Universidad Católica, Santiago, Working paper No. 2, 1972; and A. Mattelart and M. Mattelart, *La mujer chilena en una nueva sociedad* (Santiago, Editorial del Pacifico, 1968).

[8] A comparative investigation on urban fertility in Latin American cities directed by the Centro Latinoamericano de Demografía found that in all of them, active women carried out mainly manual activities; and, excluding Buenos Aires and San José, especially non-specialized manual occupations. At the same time, it was found that either they had no formal education or had only completed several years of primary education.

roles in the marginal family in general, but especially in those organized as a consensual union The actual exercise of authority with regard to the children and the representation of the family to the outside world fall primarily on the mother. According to some, this [illegible]

ities [9]

65. Frequent absences of the mother from the home bring about norms of socialization different from those of other families Older children and neighbours are those who principally fill the role of socializing agents The former are charged with caring for the younger children, preparing meals and cleaning house When they are not at home, because they in turn are working, the neighbours assume the tasks vital to the survival of the smallest children Mothers and older children are the principal internal socializing agents for the family, while neighbours are the principal external agents

66. The preceding patterns differ from those in families where the household head carries out stable manual activities, preferably of an industrial nature A first difference arises with respect to the type of union. Duque and Pastrana [9] and Torres-Rivas [10] agree in pointing out that in these families also consensual union has enjoyed ample legitimacy, but that its incidence would tend to diminish Several factors combine to produce this situation. On the one hand, the husband's activity allows the family an easier access to benefits provided by social security legislation and, in general, by all legislation designed to protect the family. As many of the benefits of these laws require legal matrimony, couples who for years had lived together without legalizing their union found themselves impelled to do so in order to gain access to these benefits On the other hand, it has been pointed out that there exists a close relationship between the power of trade unions and the insurance and social security benefits they have obtained for their members. Labourers with stable work, comparatively high wages and membership in a generous system of social benefits in fact find themselves much closer to the middle class than to the other sectors of manual labourers, the marginal and underemployed. In the Chilean case, many of them have even obtained a legal definition as "employees" (white-collar) rather than "workers" (blue-collar), independent of their type of work All this leads to an attempt to adopt the standards of behaviour and life-style of "employees", that is, standards and style of the middle class which do not permit simple consensual unions

67 The internal division of roles is clearer in families of this type The husband is the economic support of the family and the mother assumes the functions of socialization. When the wife works, she does it sporadically, part-time and usually in activities that entail a greater degree of specialization than activities carried out by marginal mothers The standards *of authority are shared by both partners, with the* mother maintaining them within the house and the father making decisions that go beyond the family context The children are freed from the tasks of socializing their younger siblings and from the necessity of interrupting their studies in order to work and contribute to the family income

68. The studies mentioned previously also note certain differences with respect to the way in which the children's role is defined In both types of families, the mothers see the acquisition of a higher level of education than they themselves have achieved as a means of assuring upward social mobility for their children However, in those cases where the household head carries out unstable economic activities, the aspiration to give them a better education conflicts with the necessity to work from an early age and/or help with domestic chores The consequence of this is that many young people are forced to abandon school in the early years of primary education In contrast, the children of fathers with more stable and better paid occupations have a greater possibility of finishing their primary education In the case of the family that has been called here "urban-marginal", the children are considered providers of income for the immediate support of the family, whereas in industrial workers' families, there is a tendency to see them as an eventual aid in bettering the future social position of the family

69 The role assigned to the children clarifies a more subtle aspect, but, nevertheless, one of great consequence· the temporal orientation of family activity. In marginal families, the necessity of daily survival, instability towards the future, difficulties of access to the benefits of social legislation, and, in general, all the factors that have been mentioned previously, contribute to a short temporal dimension of their activities and aspirations. Realistically, given their situation, these families do not plan long-range activities, lacking a vision of goal in the future towards which they can orient their actions. In contrast, greater economic stability, more active participation in unions and community organizations, the real rise in level of living that some have experienced, greater participation in the durable goods market and instalment buying, all contribute to a broader time dimension for the families of industrial workers. The existence of long-range goals and the possibility of achieving them gradually makes the actions of these family groups much more open to planning than those of marginal families

70 All the contrasts that have been exposed among families in the urban manual strata, according to type of occupation of the household head, allow one to draw the conclusion that these families constitute distinct categories Seen in the wider context of effects d

[9] J Duque and E. Pastrana, *op cit*

[10] *On this topic, there is an especially interesting study by* E Torres-Rivas, "Familia y Juventud en El Salvador", in A Gurrieri y otros, *op cit*, pp 195-281

by employment, income distribution, insurance and social security policies, these categories appear to be a consequence of the increasing closeness they have produced between the middle class of non-manual workers and industrial workers and, vice versa, the fact of unemployment and underemployment in the cities has caused an increasing gap between the employed industrial worker and the unemployed and under-employed.

The change in reproductive behaviour in the urban popular sectors

71. Up to this point, the analysis leads one to think that, should the theoretical assumptions so far made be valid, the tendency to change reproductive behaviour would be different for the two family types that have been characterized.

72. Bearing in mind the structure of the working-class family and the characteristics of the social context in which it is placed, a reduced number of children seems to be more functional than a large one, in order to satisfy its needs and to achieve its aspirations. This leads one to think that the continuance in some cases of permanent high levels of fertility in this type of family is due, on the one hand, to the persistence of cultural values and norms oriented toward a numerous family; and, on the other hand, to the lack or insufficient development of factors that permit a controlled behaviour or facilitate its practice.

73. Situations like these make it understandable that the decrease of birth rate in such sectors is often initiated with a growing resort to abortion which, given prevailing legal conditions and the restrictions of medical institutions, is carried out clandestinely and in unsanitary conditions, meaning a high risk for the mother's life. Such situations demonstrate the existing tendency towards a reduced family or at least towards the desire not to increase the family group with a new child and also that the appropriate means of reaching such an objective are lacking.

74. Therefore, a high degree of receptivity for family planning programmes can be expected from this type of family because ultimately they satisfy a felt need. Should there be underlying cultural resistance, it can be removed through education and propaganda, thus making conscious a need which arises from the very structure of the family and its context.

75. The situation of the marginal family is not so clear. The orientation towards a high fertility is supported not only by traditional cultural patterns frequently internalized in their original rural context, but by certain advantages derived from a large number of children. These advantages may neutralize to some extent the disadvantages that a large family in the urban environment must put up with (high costs of food, cramped and wretched housing etc.).

76. So it appears that, though minor changes in fertility in the marginal strata can be achieved through the diffusion of family planning programmes or the liberalization of abortion laws, it should be difficult to obtain a permanent and generalized orientation towards a small family unless their marginal situation in the economical and social structure can be fundamentally modified. From this point of view, the population policy cannot be formulated unless it is supported by other policies oriented to modify the structural conditions that will finally determine the demographic dynamics.

The rural context

77. It is possible to identify different kinds of socio-economic contexts in the rural areas of Latin America, as well as various kinds of agricultural exploitation and a great variety of types of family structure. The conditions discussed here refer to peasant families linked to forms of land tenure and exploitation that are usually denominated as *minifundio-latifundio* complex. However, these considerations can also be valid for other types of situations.

78. The social structure in this context is characterized as bi-classist, with a very low interstrata permeability and consequently limited expectation of social mobility, except by migration towards urban centres. The peasant either possesses his own small plot of land (*minifundio*) or profits from a piece of land of the large estate (*latifundio*) in exchange for part of the family's labour. The *minifundio* owner, due to the normally very reduced size of his farm, sells part of the family's labour to the *latifundio* owner. The working salary usually is given mainly in kind or in benefits (use of a house, food for the animals etc.) with a little monetized and self-consumption economy predominating. Access to health and education services, in particular, is usually very limited, as is access to social security.

The family structure

79. Predominating in this context is the extended family, reinforced in the fulfilment of its multiple economic functions, of socialization and protection by an active set of kinship relations. The woman, besides performing an active socializing role, usually also participates in agricultural and economic activities together with the other members of the family. In this respect, it must be noted that the work performed by a woman out of the house is not incompatible with her role as a mother. This is due, on the one hand, to the fact that the working conditions are generally flexible, are near home and include the possibility of being accompanied by the children; and, on the other hand, that the responsibility of fulfilling the maternal role is diluted within the extended family.

80. In this kind of family structure, the children play an active economic role from early childhood. Their maintenance cost is low, due to the predominating forms of self-consumption. In this case, having a large number of children contributes positively to the economic efficiency and importance of the family group; it gives stability to the social position of the

family in expanding the set of kinship relations and, in this way, it also gives stability and security to the couple in their old age.

81 [illegible]

an increase in the number of surviving children. It would appear, however, that this phenomenon has been more than neutralized by the migratory flow towards the cities [11] that frequently separates the eldest children from their homes, thus reducing the size of the family nucleus living around the parents. It can be concluded that this phenomenon helps to stimulate fertility

The change in reproductive behaviour in the peasant family

82. In the type of peasant family that has just been described, the absence of reproductive control and its direct consequence, a large number of children, seem to be rational behaviour or at least cannot be labelled as irrational. This is due to the characteristics inherent in the socio-economic structure in which this family develops and to their particular situation in it.

83 In this context, the absence of a behaviour designed to control births is primarily due to a lack of need for it. As a consequence, the demographic acceptance and efficiency of the programmes designed to capacitate and facilitate controlled behaviour can be expected to be very low if they are not accompanied or preceded by changes at the macro-level which determine the type of prevailing family structure and the corresponding orientation towards a large number of children. The same can be said of those programmes designed to induce direct changes at the level of norms and values of reproductive behaviour (factors at the cultural level).

Population policies and other public policies

84 The analysis of the preceding sections leads one to state, first, that in order to achieve an important slow-down in the current growth rate of the region, it is necessary to induce a profound change of reproductive behaviour in the marginal urban sectors and among the peasants Secondly, it seems improbable that this change can be induced in these social sectors solely through resort to actions destined to capacitate and facilitate controlled reproductive behaviour (such as family planning programmes), without a radical modification of the prevailing structural conditions that allow a high fertility to be convenient for the functioning of the family and satisfaction of the couple's needs.

85. Assuming this situation, one is faced with the problem of which macro-social factors should be modified and through which policies

86. This is not the place for a detailed discussion of each of the economic and social policies that could create the structural conditions for a change in reproductive behaviour. Here there is only room to point out that such policies as those of employment, agrarian reform, education, social security and health would appear crucial to the creation of macro-structural conditions favourable to a decline in fertility Whether this objective is achieved will depend in great part upon the form, content and coverage given these policies This, in turn, will depend upon whether the population policy is formulated and implemented in strict interrelationship with social and economic policies.

[11] A survey of the marginal population taken at Santiago, Chile, shows that the greatest relative frequency of migration to the capital occurred among women between 15 and 19 years old and among men between 20 and 24 years old See *Fecundidad y anticoncepción en poblaciónes marginales* (Santiago, Centro para el Desarrollo Económico y Social de América Latina, and Buenos Aires, Editorio Troquel, S A , 1970)

CULTURAL AND DEMOGRAPHIC INFLUENCES ON THE AFRICAN FAMILY

G. K. Nukunya *

1. The family is without doubt the basic social unit in traditional and modern Africa, as in other parts of the world; but in almost all known societies of the continent it functions within the context of wider social units, most of which are, like the family, also based on kinship affiliations such as descent groups, extended families, secret societies and age sets. While one of the major functions of the family, the procreation of new members, is, by definition, the sole responsibility of those members occupying the positions of husband-father and wife-mother, the other major function of socialization is usually shared with wider social units. Yet, though on the surface, the two roles may appear to be separate, each one affects the other and both in turn the family cycle and size. Thus, the type and size of the wider social unit involved in the socialization process (e.g. adults within the extended family) can influence the number of children in each family, which in turn will affect the size of extended family and descent groups.

2. Although the size and complexity of political groupings can affect the nature and size of the wider social units, their effects on the family cycle are not crucial. It is true that descent groups and kinship ties appear to play a less prominent political role in centralized political systems than in non-centralized ones, [1] but political systems do not necessarily affect the nature of family life. Aristocratic and commoner families may exist side by side in the same society; and, in the main, their structure and organization fall under the same general umbrella of the society's norms of kinship organization. Much more important perhaps are the values associated with family life, family size, residence, descent, age of marriage and spacing of children, which do not appear to vary with types of political organization. In fact, in all these spheres one would be tempted to postulate that African family values show greater conformity than differences. [2] If this premise is accepted, the conflict between traditional ideals and the demands of modern living would become very instructive and substantial.

3. Marriage in the traditional set-up is primarily for procreation and the larger the number of children, the greater the prestige of the spouses, and the more useful it is in economic and social terms for the descent groups and other wider kinship units. Plurality of wives serves to enhance these ideals by buttressing their economic foundations. Today not only have the values themselves undergone changes, but the economic factors of the present, as well as education and Christian teachings, militate against large families and polygyny. The direction of some of these changes depends to a large extent upon the system of descent, that is, whether the society is patrilineal or matrilineal in its organization. In patrilineal societies, marital bonds are close, with the spouses closely identified with the agnatic groups. Modern conditions place less emphasis on the extended family ties and descent group affiliations, while the nuclear family becomes more isolated and apparently more closely knit. In matrilineal societies, on the other hand, the minimal role played by the father in traditional jural relations within the family is giving way to greater responsibility towards the children and a lessening of the avunculate. Here again, the trend is towards a gradual isolation and solidarity of the nuclear family.

Basic features of traditional African family life

4. The most important common element in traditional family ideals is the high value placed on children. Fertility in both men and women is greatly cherished, while childlessness provokes sad and agonizing reactions from relatives, in particular, and from the community at large. Childlessness may not necessarily result from barrenness as the incidence of stillbirths and infant mortality was high. The most effective insurance against childlessness therefore became, within the limits of culturally defined rules, the fullest utilization of the reproductive potential. At the same time, there are numerous and varied sexual taboos which greatly control sex life, thereby limiting the reproductive capacity.

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[1] African political systems have been divided into centralized and non-centralized systems. The former are those which have centralized authority, administrative machinery and judicial institutions—in short, a Government—and in which cleavages of wealth, privilege and status correspond to the distribution of power and authority. The other group consists of those societies in which there are no sharp divisions of rank, status or wealth. M. Fortes and E. E. Evans Pritchard, eds., *African Political Systems* (London, Oxford University Press, for the International Institute of African Languages and Cultures, 1940), p. 15.

[2] Lucy Mair, *African Marriage and Social Change* (London, Oxford University Press, 1969).

5. By far the most widespread among these limiting factors is the weaning taboo found in almost all African societies This taboo derives from the belief that the semen contaminates the mother's milk, which then becomes dangerous for the infant's health It is therefore imperative for the mother to renounce sex throughout the period of breast-feeding, which ranges from two years to over three years. As Africans feel that a man, as opposed to a woman, cannot abjure sex for this period, this taboo serves as a pretext for men to indulge in polygyny and adultery.[3] It means regulating the reproductive processes of the co-wives in such a way that while one wife is breastfeeding her child, the others will be in a position to provide him with sexual services

6. A less common practice is the generational taboo by which a woman is expected to stop childbearing as soon as one of her own children begins to have children This is said to prevent conflict between age and generational seniority among close relatives

7 Age of marriage is another limiting factor, especially for men As a rule, for first marriages, men marry much later in life than women. Marriage for women in most societies takes place soon after puberty, usually between 16 and 18 years. For men, however, 20-plus appears to be the ideal and, in fact, the practice [4] Thus, whereas women are given the opportunity to begin their reproductive activities as soon as they are known to qualify biologically, the same opportunity is not available to a man, thus greatly limiting his reproductive potential

8 Polygyny is also generally believed to be a factor affecting the reproductive process and, in turn, the size of the family and households Although for most African groups it is a method of providing more children per husband or household, and quantitative data exist to support this view, several studies have shown that polygyny, in fact, has a lowering effect on reproduction,[5] due to the fact that the over-all reproductive potential for any given society is based not on children per husband but rather on a per-wife basis. Comparison between women in monogamous and polygamous unions shows that in more cases than not the former are more fertile [6] It is, however, difficult to give an unqualified confirmation of this because of the fragmentary nature of the data and other variables which may have affected the reproductive process. However, the data published so far indicate that polygyny does have a lowering effect on fertility.

9. The effect of this factor on the size of descent groups, however, is more favourable than on the population size as a whole. Here again, though, a distinction has to be made between patrilineal and matrilineal societies A plurality of wives in a patrilineal society will increase the number of children per husband, while in a matrilineal society it will decrease the fertility of the women and thereby adversely affect the size of their descent groups

10 Though polygyny is an old established form of African family life, its incidence and intensity in traditional Africa have not been accurately ascertained But the popular conception of polygyny, that every man has a large number of wives, is far from correct. In the main, the proportion of polygynous men among the total married male population is less than half and the common numbers of wives per polygynous husband are two and three [7] Only chiefs and wealthy men exceeded this level In a study of two Ewe-speaking rural communities in 1962, about 70 per cent of polygynous husbands had only two wives in a population in which 42 4 per cent of married men were polygynous [8]

11 Marital stability, another important factor in fertility, is also a function of variations in descent organization According to the famous Gluckman hypothesis, marriage is likely to be more stable in societies organized on a system of corporate patrilineages than in others [9] In patrilineal societies, it is through women married into the family group from outside that new members are provided These societies therefore have several mechanisms for ensuring stable marriages Matrilineal societies do not face this problem Though stable marriages can be satisfying to them, it is not crucial for their survival as a child belongs to its mother's descent group regardless of whether she is married.

12. Since fertility, measured per woman over a given period of years, decreases as instability increases,[10] it would be expected that, on the whole, societies with corporate patrilineal descent groups would have higher fertility rates than those organized otherwise. Further, as patrilineal societies outnumber others in Africa by about 4 to 1, the importance of this element in demographic studies cannot be overestimated.

13. It is common knowledge that the weaning taboo was not as scrupulously observed as the anthropologist is led to believe This appears to hold whether one is concerned with polygynous or monogamous unions

[3] G K Nukunya, *Kinship and Marriage Among the Anlo* [illegible]

e g., the Ewe

[5] V R Dorjahn, *The Demographic Aspects of African Polygyny* (Ann Arbor, University of Michigan Press, 1954), pp 310-370, V R Dorjahn, "Polygyny in African demography", in W R Bascom and M Herskovits, eds., *Continuity and Change in African Cultures* (Chicago, Chicago University Press, 1959), pp 109-110

[6] V R Dorjahn, *The Demographic Aspects of African Polygyny*, loc cit

[7] G Lindblom, *The Akamba* (Uppsala, Nordiska Afrikainstitutet, 1920), p 81

[8] G K Nukunya, *op cit*, p 158.

[9] M. Gluckman, "Kinship and marriage among the Lozi of Northern Rhodesia and the Zulu of Natal", in A R Radcliffe-Brown and D Forde, eds, *African Systems of Kinship and Marriage* (London, Oxford University Press, 1950), pp 167-206

[10] V R Dorjahn, "Polygyny in African demography", *loc. cit*, p 110

As such, there were often shorter intervals between births than the weaning taboos prescribed. On the whole, therefore, biological factors of limitation rather than cultural determinants influenced spacing of children in the traditional system. Needless to say, short intervals between births greatly increased high infant mortality and poor health conditions for the family as a whole, with the notable exceptions of husbands and adult male children. All these factors must be considered within a background of generally poor medical facilities which was an essential feature of traditional Africa. It is also worthy of note that despite the hazards of reproduction and childbirth to which women are exposed, the life span of women is still longer than that of men. In Ghana, where the average life span is among the highest on the continent, the life expectancies are about 50 years for women and 45 years for men. It appears that the physical hazards of life, accidents, alcoholism and indulgence have greater effects on men than on women. Homicide and suicide also involve predominantly more men than women.[11]

14. Rules relating to age at marriage appear to have been more closely adhered to than other tribal prohibitions. Even here, the widespread ignorance about age must put serious question marks after such claims. What is certain in all this is the knowledge that the facts concerning modern practices are available and can be used to clarify the possible institutions and values of the past which have been suggested from inconclusive data.

15. If these qualifications are borne in mind, the essential features of African traditional family life may be listed as polygyny, the tendency towards exhaustion of female reproductive activities, different ages of marriage for males and females, inadequate health facilities and the preference for large families. The life of the family unit was short, with the number of adults and aged members disproportionately small in relation to the number of youths and young children.

Social change, population and the family

16. Although the ideals and the important elements of the traditional family have largely persisted, changes in a number of areas have also been occurring. Notable among these changes are improved hygienic conditions, Western forms of education, Christian influence and increased mobility. If, as has been suggested, inadequate health practices affected the structure of the traditional family, improvements in this sphere would also inevitably alter that structure. The most decisive effect of such improvements would be an increase in the ratio of the adult population to youths and children, and therefore longer life for the family unit. In fact, although the provision of health facilities on the continent is still far from adequate, the position is gradually improving. However, these facilities are rather unevenly distributed, with the poorer countries of the western Sudan and Central Africa lagging somewhat behind the relatively "rich" ones like Ghana, Ivory Coast, Nigeria, Zaire etc., even though these are inadequate by world standards. If, as it is hoped, the trend towards improvement continues, some basic African attitudes will have to be seriously reconsidered in the near future. A large number of aged, for instance, would be a heavy strain on family resources, thereby threatening the African's traditional attachment to and support for his aged. Old people's homes, which to the traditional African are anathema and a cruel practice, may well become an acceptable method of caring for the aged.

17. The influences of Western education and Christianity are also tremendous. Many Africans who have been exposed to them have become alienated from many of their traditional usages.[12] By using modern feeding methods to supplement breast-feeding, the dangers of the weaning taboo cease to have much relevance. Polygyny has lost much of its traditional appeal. In the past, wealth consisted largely of dependants who could help in economic activities. Indeed, in many societies, the well-remembered names of the past are those of men who had several wives and slaves, whose offspring now form the core of many villages. Currently, in addition to the fact that polygyny is opposed by the churches, wealth and leadership can be obtained by other means. Moreover, polygyny demands greater expenses now than before. People who have many wives must be able to feed them. In the early days of colonialism, the few people who were able to make money had limited use for it. Giving marriage payments and buying slaves were the chief uses to which it was put. Today, there are not only many other uses for money, but it can be obtained in several other ways. It is, however, not certain whether the apparent reduction in polygynous unions would contribute much to population change. If anything, by itself, it should, according to the suggestion made in paragraph 8, lead to an increase in the over-all population. However, when viewed in conjunction with other practices which have come in the wake of Christianity and formal education, the regulation of family size and access to family planning techniques, the over-all picture may be different. The data on this score *still* remain inconclusive and further studies in this area are needed before a more positive assertion can be made. Moreover, it must be remembered that only a fraction of the total population is exposed to these influences, while even among this fraction many have not accepted the ideas usually associated with these important factors of change.[13]

18. Perhaps one of the most important factors of change affecting the family cycle is the movement of

[11] P. Bohannan, ed., *African Suicide and Homicide* (Princeton, New Jersey, Princeton University Press, 1960).

[12] G. K. Nukunya, *op. cit.*, pp. 162-208; D. Brokensha, *Social Change at Larteh, Ghana* (Oxford, Clarendon Press, 1966); K. A. Busia, "The Ashanti", in D. Forde, ed., *African Worlds* (London, Oxford University Press, 1954); Lucy Mair, *Introduction to Social Anthropology* (London, Oxford University Press, 1965), pp. 233-252.

[13] D. Brokensha, *op. cit.*

people to towns and centres of wage employment. The exodus is usually from economically depressed areas like Botswana, Lesotho, Malawi, Swaziland and northern and southern Zambia in central and southern Africa and the western Sudan in west Africa, while areas of immigration include the forest zones of west Africa and the mining complexes of central and southern Africa. Another form of migration that cuts across economically defined geographical boundaries is one involving school and college graduates moving into commercial, administrative and industrial centres. The latter is a permanent sort of movement involving the whole nuclear family, while most of the former involves individuals of both sexes, with males featuring more prominently.

19. Where adult males migrate from the family, as is the case in the depressed areas mentioned, the family cycle is greatly disrupted. The sex ratio is heavily tilted in favour of females; and, as a rule, households headed by women develop in large numbers. The composition of the domestic groups assumes a more complex character as adults remaining at home take charge of children left behind by migrating parents.[14] This is particularly true of places where school education for children has become important. Yet, the people involved may regard their participation as a function within the descent system, whether the society follows matrilineal or patrilineal rules of organization. In patrilineal societies, the core of the domestic groups is usually the nuclear family, though matriarchies can develop as a result of emigration.[15] In matrilineal societies, what Fortes[16] reports for the Ashanti appears to have wider applicability. He distinguishes three different types of household composition:

(a) Households grouped around a husband and wife. In the simplest case this corresponds to the elementary family consisting of a man, his wife and their children, but other kinsfolk may be included in the group;

(b) Households grouped around an effective minimal matrilineage or part of it, such as a woman and her sister or daughter, or a man and his sister or sister's son;

(c) Households made up of a combination of the previous types, e.g., a household consisting of a man and his wife and children as well as his sister's children.

This finding is largely supported by other studies of matrilineal societies, especially those in the matrilineal belt of Central Africa.[17] It is important to remember that in all descent systems the family unit itself is not static. It has a growth cycle by which its initial simplicity in terms of composition is greatly affected in later years.[18]

20. Migration of the whole nuclear family may also have its disruptive consequences, especially on the extended family and the descent group. Gaps develop in the personnel performing essential group functions and substitutes have to be employed. Younger members may have to perform functions traditionally reserved for the very old and vice versa. Duties usually performed by families standing in specific structural relationship with or within the group may fall into the hands of any available relatives regardless of whether their structural position merits it. For instance, in one Ewe community terribly afflicted by emigration, one of the four wards in the town was so completely depleted that it cannot now function without the assistance of others. At dances and funeral rites the active co-operation of people from other wards is always sought.[19]

21. Divorce rates and marital stability have also been affected by contemporary social changes. The sanctions that made for stability in the past have undergone considerable modifications or have been completely destroyed. Well-knit, stable descent groups and strong family ties, as well as such practices as the levirate widow inheritance, sororate, sororal polygyny and the so-called "house property complex", which all helped to stabilize marriage in the past, have been drastically curtailed. Social norms have become more flexible. As a result, marital stability even in traditionally stable societies has been greatly reduced. Studies of marriage and social change in a number of societies have generally supported this view.[20] As far as the family cycle is concerned, the effect of this development will be a tendency towards further reduction in the fertility of women.

22. While social changes continue to affect African institutions relating to population and the family, systematic efforts by Governments, in the form of family planning programmes, have been under way throughout the entire continent. People are now being exposed to birth-control measures in a manner which makes their acceptance quite easy. In Ghana, for instance, the pill and other forms of birth control are subsidized through governmental support to meet the pockets of any one in need of them. It is reasonable to assume that, in the initial stages of official government participation in this exercise, those who really need services, namely the poor and the rural folk, would not readily comprehend the significance of the programme. However, with greater education, it is difficult to see how an all-out effort by Governments

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[14] G. K. Nukunya, *op. cit.*, pp. 127-143.

[15] *Ibid.*

[16] M. Fortes, *Social Structure*, studies presented to A. R. Radcliffe-Brown (London, Oxford University Press, 1949), p. 69.

[17] A. I. Richards, "Some types of family structure among the central Bantu", in A. R. Radcliffe-Brown and D. Forde, eds., *African Systems of Kinship and Marriage* (London, Oxford University Press, 1950).

[18] M. Fortes, "Introduction", in J. R. Goody, ed., [illegible] Cambridge [illegible] Uni[illegible] 54 [illegible] *in structural change among the Fort Jameson Ngoni*, R. Livingstone paper No. 20 (Cape Town, Oxford University Press, 1951).

can fail to alter radically people's attitudes. Needless to say, modern family planning and birth-control measures directed principally towards regulating family size and, by extension, the over-all national figure do not tally with traditional ideas. However, economic factors are now forcing people to put reduced value on large families and to emphasize rather the quality of life of the families they have. Childlessness and barrenness, loathed in traditional Africa, still provoke the same reaction but a one-child family, instead of being considered a liability, may well become an asset in the future. Today, the educated *élite* appears to have accepted the new gospel, while the poor, battering under the sweat of economic pressures, are still in the consideration stage. Still, it is fair to assume that a general acceptance in the not too distant future is not a misplaced optimism.

Conclusion

23. Social structure and population affect each other. The rules that govern the organization of society are essential factors in population size and change. They determine the extent to which external and internal forces of change can be accommodated within a particular structural framework. At the same time, changes, when they do occur, tend to generate social consequences which affect the structural framework itself. In traditional Africa, the family ideals, epitomized by emphasis on large families, were related to other aspects of the social structure, namely, the extended family system, descent groups, respect for age etc. The quest for large families was closely related to a number of restrictive mechanisms on reproductive activities, such as the weaning taboo. Again, the family ideal used to be greatly affected by the poor hygienic conditions and inadequate medical facilities which greatly contributed to high infant and over-all mortality. All in all, the traditional emphasis on a large number of children had to contend with many negative influences. Yet, with a high mortality rate it was the only sure way of survival.

24. Today, the emphasis has shifted considerably, not only in attitudes and ideals but in the structure. Contemporary factors of change have introduced attitudes and economic conditions that require radical changes in family size and the value placed on children. The change may take a long time to cover all sections of the population. Barring unforeseen consequences, however, it appears to be an irreversible trend which will result in smaller families and a larger proportion of adults and the aged in the family in particular and in the population at large. If this happens, certain basic family ideas and attitudes, such as those concerning the treatment of the aged, would have to be altered accordingly.

THE FAMILY AND FERTILITY CONTROL: A DISCUSSION OF SOME CENTRAL ISSUES IN THE SYMPOSIUM ON POPULATION AND THE FAMILY *

Judith Blake-Davis **

1. In concentrating on the family, this Symposium concerns itself with the principal intervening variable between the aggregated, or macroscopic demographic *behaviour of individuals as represented by birth rates,* rates of growth, and population size, on the one hand, and, on the other, by individual decisions to undertake (or not to undertake) certain kinds of action, such as to use contraceptives or migrate.

2. It is at the level of individual decision to take a particular action that family planning programmes operate. It is the macroscopic level that demographers typically use for analysis.

3 In appreciating the policy importance of considering the family, one must be clear that aggregated balances of fertility and mortality are not, as far as is known, the focus of individual perception and motivation. The demographic adjustment of societies is an institutional adjustment, and it is through the components of such institutions as the family that individual motivation is structured.

4 As an example, one may give the one that has been argued recently, the relation of fertility to mortality levels.

5. Characteristically, demographers are fond of pointing out that the fertility of traditional, peasant societies has had to be high to counterbalance the high and fluctuating mortality. Those societies that were not able to produce the requisite fertility simply did not stay around Unfortunately, some people have tended to regard this long-term evolutionary statement as a perfectly adequate explanation of the motivation of individuals Individuals are said to be primarily motivated in their family-size preferences by the mortality situation. They want large families because of high mortality Reduce the mortality and everyone "adjusts".

6. This view of the situation leaves out of account entirely that the way in which societies have adjusted to high mortality is through their institutional structure, not through the unlikely chance that some would, for inexplicable reasons, contain a majority of individuals dedicated to maintaining a demographic balance, whereas others would be wiped out for lack of such altruists. Moreover, those societies that have survived have motivated individuals not merely to compensate for the average mortality situation, but to over-*compensate for it and thus offset the disastrous effects* of mortality peaks

7 The institutional structure that has provided this motivation has had, however, a positive rather than a preventive focus To be sure, the family and kinship in traditional peasant societies has functioned in such a way as to over-compensate for mortality. However, the family-size desires of individuals have been geared, independently of mortality, to a utility-cost schedule that has the family and the kinship structure as its focus The weights in this schedule have been such as to make people want to do what the society needed—produce large families. People have been hooked into a system in which kinship and the family are ends in themselves, and are also instrumental in bringing about other ultimate goals. This fact must be understood in order to comprehend why, when mortality conditions change, the fertility response is often extremely sluggish. Indeed, as Tabbarah [1] has pointed out, it may be that in some peasant societies people are very far from achieving the number of living children they desire and hence a decline in mortality simply aids them in reaching their family-size goal

8 Consider first the utilities of children in traditional, agricultural societies. These comprise not only the well-understood economic advantages, but the non-economic utilities. Individuals not only use children for labour and depend upon them for care and assistance later in life, they also gain the only rewarded statuses in the kinship system through having children and thereby becoming parents. Further, the kinship system is either pre-eminent, or among the most pre-eminent, factors in the society. Other sectors, non-kinship sectors, are typically linked with kinship in some intrinsic fashion For example, a priestly role will simultaneously be familial rather than belonging to a celibate, or salvation will depend upon rituals performed by others after one's death rather than upon one's own conduct and efforts Because structures alternative to kinship and the family may well be suppressed, the individual is highly dependent upon the family for protection, influence, support and social status. The more the society is

* The original text of this paper was submitted as a Con- [illegible]

[1] Riad B Tabbarah, "Toward a theory of demographic development", *Economic Development and Cultural Change* (Chicago, Illinois), vol 19 (January 1971), pp 257-275.

oriented around kinship, and the more other roles depend upon the basic kinship roles, then, by definition, the more the individual enjoys non-economic as well as economic utilities by creating and maintaining a family.

9. What about the costs of children? In subsistence economies, the direct economic costs of children tend to be camouflaged by a lack of the enforced accounting that a monetary system imposes. More important, the range of quality in children is likely to be held down by the over-all societal limitations. Where, for example, excellent medical and dental care are unavailable and educational facilities are marginal, the children of privilege and the children of poverty are more similar than are those in modern societies. The direct non-economic costs of offspring are also minimized by the availability of a wider kinship network to help with child-rearing, and by the fact that the authoritarian position of parents allows them to place older children *in loco parentis* with respect to younger ones. In general, the expectation is not that the parents put out enormous amounts of effort, but that they receive from children.

10. At the level of indirect economic costs, it is obvious that, given the limited opportunities for social and geographical mobility, little competes with children. Parents do not have an enormous and nagging sense of things forgone, things on which they could have spent their money or resources, had they not had so many children. Wives do not see earnings going a-glimmering. By the same token, indirect non-economic costs are restricted. The range of activities on which to spend personal energies or leisure time is circumscribed. Moreover, children do not typically compete with these as they would in a society in which such activities are often most enjoyably pursued without children around.

11. In sum, therefore, when utilities and costs are weighed, economic or non-economic, direct or indirect, a situation emerges that maximizes what the individual is likely to regard as his gain by having children in relation to other possible gains, and minimizes his costs. One must realize, however, that both utilities and costs are kept pro-natalist by means of intense social control over such elements as the roles and activities of women and youth, as well as over social and geographical mobility. An individual's family-size desires are thus "voluntary" only in the very limited sense that, given this highly controlled situation, and the implicit and explicit coercions in maintaining the utilities and costs as they are, he "chooses" to have a large family.

12. Conversely, what one wants to recognize is that the mechanism of fertility decline carries the double bind of a loss of advantages and an increase in disadvantages of children, combined with augmented parental responsibility for child-rearing. In this sense, one can say that the industrial revolution changed the ground rules for reproduction—it literally boxed parents in. Potential policy in developing countries would be capable of doing the same thing and, the present author would argue, of promoting individual welfare at the same time.

13. This discussion leads to the issue of implicit *versus* explicit policy. It is very important, in considering future explicit policies, to have a clear awareness of their current implicit counterparts. Otherwise, the possible or potential policies are judged according to Utopian criteria. It is piously averred that such planned policies must harm no one, must conform to the highest standards of human rights and must affirm the noblest goals. Meanwhile, back in the real world, existing kinship structures and systems of stratification help to consign a large share of the world's people to material degradation and psychological despair.

14. The point here is that implicit pro-natalism has had its costs, which should not be minimized when one compares it with explicit anti-natalism. To achieve the family structures one sees in actuality in developing societies, there has been a widespread subordination of individual potential: the potential of women as human beings throughout life; the potential of the young in general; the contribution of persons who do not conform to the reproductive model. The present author would argue that a benefit of low mortality is that this intense constraint over individuals is no longer necessary. Because the whole process is more efficient, it is no longer required that individuals be forced to devote so much of themselves to the business of reproduction.

15. It appears to be crucial that political leaders should realize that in their countries they are not beginning from scratch as concerns family policy and its relation to population. They are beginning from a base of existing policies, most of them favouring high fertility and social rigidity. The State, through its laws and its legitimations of public policy, is, in most developing countries, already being coercive and constraining by putting the family before the individual. In some countries, this is strongly abetted by religious organizations.

16. In supporting the familial *status quo*, politicians are thus not casting their lot with the mass of individuals, or with the rights of individuals in some abstract sense. They are casting their lot with those selected individuals who benefit disproportionately from the family structure as it now stands. And, in many countries of the world, if one looks at family structure on a status-by-status basis—older son, younger son, daughters, wives, mothers-in-law and so on—one can find that there are more people getting very little out of the family than there are getting a lot. There is, in effect, an enormous amount of exploitation of some types of family members by a very few others. It does not appear obvious to this writer that the State should regard such patterns as sacred. Nor should there be unreflecting acquiescence on the view that policies selectively attempting to change pro-natalist aspects of the family would infringe, by definition, on individual freedoms and deeply personal aspects of behaviour. The liberating effect of such policies for most individuals should be considered as well.

17. A third point that should be brought into the open because of its long-run policy implications is the reluctance of many developing countries to admit officially that they have a population problem requiring a specific population policy. They are willing to admit that they have a social and economic development problem and that this is why demographic increase appears undesirable, but they are reluctant to accord independent status to a population problem. In particular, they are unwilling to think of a distinctive policy to control fertility It is instructive to ask why There are, of course, many broad sociological reasons (some of which have been discussed above), and there are reasons that are idiosyncratic to the countries concerned. But there are also some reasons of particular political relevance to the World Population Year in 1974 and to the way in which world leaders are approached

18. For one, the developed countries have helped to cause this resistance to public recognition of population issues by bearing down so hard on the problem of population growth among developing peoples Recently, this issue has been given enormous saliency in the dealings with them, and, in the process, they have had unleashed on them a foreign family planning bureaucracy that is an independent force with which they have had to cope In effect, a purely adventitious cost has been introduced into the receptivity to fertility control—the cost of coping with the developed countries and keeping their heavy-handed prodding in check

19. Secondly, by exhibiting such stunning eagerness to reduce population growth in developing countries, the developed countries have set in operation what Waller called "the principle of least interest" If people in the developed countries are so concerned, what is it worth to them to implement their desires? Leaders in developing countries cannot help but see the potential here It is highly advantageous to take the point of view in such countries that it means more to them than to the developing world that it reduce its fertility. So, the question then becomes, how much is it worth? Can the anxieties of the developed countries be parlayed into having them underwrite all sorts of other programmes as a condition of accepting family planning, or some fertility control policies? How far can they be pushed?

20 This may appear to be a canny ploy, but with regard to an issue of such moment, it is bad business The only healthy arrangement would appear to be for the developed countries to cease being the prime movers, to cease making developing countries think that it is more in the interest of the developed countries than in their own interest that they reduce fertility, and, hence, to cease creating an international situation in which the population issue has become a pawn

21 Lastly, this author believes that considerable attention must be paid to the question of the way in which politicians perceive the population issue This involves an extension to the political level of the kind of analysis that Ryder considered in relation to the *family members in his paper*

22. Ryder's paper deals with a problem very familiar to social scientists—the disparity between the point of view of the actor within a system and the point of view of the observer of that system These two points of view differ in at least two important ways First, the actor internalizes the goals and norms—they are his and he acts in terms of them The observer, on the other hand, studies them and their relation to behaviour. Secondly, the observer (in this case, the demographer) may study the aggregated behaviour of many actors and thus move to another level of analysis entirely from that of the actor.

23 Ryder has juxtaposed the way it looks to the actor within each family against the way it looks to the observer studying the aggregated behaviour of many families (in rates and indices), and he has attempted to show that what may be a highly disadvantageous situation in the aggregate, can, none the less, be perceived by the individual inside the family as having certain advantages.

24. This disparity of analytical visions must be extended also to the politician Politicians as yet are poorly situated to subscribe to the analytical view of the observer concerning population increase One reason is that this view tells about very lagged negative effects of population growth, whereas from the politician's point of view there may actually be some immediate positive effects—a large supply of cheap labour, for example

25 [illegible]
of persc [illegible]
25 year [illegible]
does not concern him so much as what will happen tomorrow Hence, the policy issues concerning population must be presented far more in terms that bring out the immediate difficulties of population growth, rather than the long-run ones

26 This task is not easy, and it is the Achilles heel of national population policies and one of the principal causes of sensational over-statement. In talking to politicians about population, one is competing for attention with many immediate issues And demographers have, as yet, done poorly in presenting the case of population increase as an immediate issue. The politician must somehow come to understand the costs to him of ignoring it, rather than the costs to future generations which he can, understandably, discount heavily

27. But for national leaders to appreciate short-run impacts of demographic events, demographers must first be able to delineate them very clearly. The present author believes that demographers have underestimated the importance of doing this if one wishes to have an effect on policy. In this regard, a concentration on the family and kinship is perhaps one of the best jumping-off points, for the family *formation behaviour and decisions* of young people as they currently go about creating the population growth of the future (or delay or refrain from doing so) do have impact in the here and now—for example, impact on demand for housing,

migration into burgeoning urban slums, the need for and location of public and individual health services and, perhaps above all, the skills and mobility of the existing labour force. Only if it is made clear that in discussing reproductive behaviour, one is discussing an entire institutional complex, not just fertility rates, will it be possible to begin to pin-point for others the large-scale, day-to-day effects of the organizational arrangements that produce high or low fertility.

28. In attempting to trace the short-run effects of birth rates, those rates cannot be divorced from the family structure that produces them. Birth rates are indicators of a particular kind of allocation and organization of human resources and energies. If the history of the modern world has anything to teach the developing world, it is that the quality and organization of this human factor, rather than capital, non-human resources or quantity of labour, has been the single most important element in increasing *per capita* output and development. For the leaders of developing countries not to appreciate the daily losses incurred by allowing the energies and talents of young adults to continue to be drained into what has become functionless reproduction represents a tragic misconception. Although there may be numerous non-intellectual reasons for maintaining this misconception, demographers can make a genuine contribution by providing the factual documentation for dispelling it.

Part Seven

POPULATION AND HUMAN RIGHTS

UNITED NATIONS STANDARDS CONCERNING THE RELATIONSHIP BETWEEN HUMAN RIGHTS AND VARIOUS POPULATION QUESTIONS *

United Nations Secretariat **

1. Taking a broad view of the subject, it perhaps might be possible to assert that all or almost all the instruments concerning human rights adopted by or under the auspices of the United Nations bear some relation to population problems However, in order to help the reader gain a clear understanding of what might be regarded as the guidelines for United Nations normative work in the field of human rights and population, and also because of limitations on documentation, this analysis concentrates on those standards which, in the light of the preparatory work, would appear to have the clearest and most direct influence on the three demographic variables fertility, mortality and migration. The word "instrument", in accordance with the generally accepted practice of the United Nations, refers to conventions as well as resolutions adopted by the United Nations General Assembly or by special conferences convened by the United Nations to which all Member States have been invited The word "standard" is used in a broad sense and does not in itself imply any judgement as to the legal nature or scope of the provisions studied. Most of the standards dealt with in this document have been reproduced *in extenso* in *Human Rights: A Compilation of International Instruments of the United Nations* [1]

2 Several instruments adopted by or under the auspices of the specialized agencies appear to be relevant to the relationship between human rights and population questions. Some of these instruments are reproduced in the above-mentioned compilation. This paper simply mentions, in each section, various instruments of the specialized agencies purely for the purpose of illustration. The same applies to various instruments of regional intergovernmental organizations.

3. Before beginning the detailed analysis of the standards concerning fertility, mortality and migration, it must be stressed that these standards cannot be isolated from the fundamental purposes and principles of the United Nations as embodied in Articles 1 and 2 of the Charter. In particular, one should always bear in mind the principle of non-discrimination, which has been set forth clearly in the Charter itself (Article 1, paragraph 3, and Article 55 c) and reaffirmed in various instruments including the Universal Declaration of Human Rights, the two international covenants on human rights [2] and the International Convention on the Elimination of All Forms of Racial Discrimination (particularly article 5, paragraphs (*b*), (*d*) (i) to (iv) and (*e*) (iv)).

UNITED NATIONS STANDARDS CONCERNING THE RELATIONSHIP BETWEEN HUMAN RIGHTS AND FERTILITY

4 Consideration should certainly be given not only to the provisions adopted by or under the auspices of the United Nations which are analysed below, but to certain instruments of the specialized agencies, in particular, the constitutions of the World Health Organization (WHO) and the United Nations Educational, Scientific and Cultural Organization (UNESCO), and several resolutions adopted by those two organizations on various questions relating to family planning, [3] and to some International Labour Organisation (ILO) conventions Among the instruments adopted by regional organizations, some articles of the European Social Charter [4] (particularly articles 16 and 17) and the European Convention for the Protection of Human Rights and Fundamental Freedoms and the Protocols relating to it [5] could, it would appear, be taken into consideration, as could articles 1 and 17 of the American Convention on Human Rights. [6] The draft principles drawn up by the Second Asian Population Conference, held at Tokyo from 11 to 23 April 1973 (see document E/CN.11/1065) and other instruments drawn up under the auspices of the regional economic commissions of the United Nations should also be taken into account.

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[4] See *European Yearbook* (The Hague, Martinus Nijhoff, 1962), vol IX, pp 246-287

[5] See *European Yearbook* (The Hague, Martinus Nijhoff, 1955), vol I, pp 316-343

[6] Organization of American States, *Treaty Series*, No. 36 (Washington D C., 1970)

Rights relating to marriage and the family

5. Among the provisions concerning the right of men and women of full age to marry and to found a family and the provisions relating to the place of the family in society, the following may be mentioned: article 16 of the Universal Declaration of Human Rights; article 23 of the International Covenant on Civil and Political Rights; article 10 of the International Covenant on Economic, Social and Cultural Rights; the 1962 Convention on Consent to Marriage, Minimum Age for Marriage and Registration of Marriages; and General Assembly resolution 2018 (XX) of 1 November 1965, which makes a recommendation on the same subjects.

6. One of the basic ideas to emerge from these standards is that of the freedom and equality of men and women with regard to the decision to marry and the rights they possess during marriage and at its dissolution. In particular, any limitations on these freedoms due to race, nationality or religion are expressly condemned in article 16, paragraph 1, of the Universal Declaration. These principles in themselves might extend the scope of the right to legitimate procreation (and as a result, perhaps, total fertility) considerably beyond the traditional limits which have often characterized it. Nevertheless, account should be taken of other United Nations norms which are also relevant to fertility (see, *inter alia*, the paras. 7 and 19-26 of this chapter) and might have the contrary effect.

7. Another aspect of this question concerns the minimum age for marriage. Article 2 of the 1962 Convention requires that legislative action should be taken to specify a minimum age for marriage, while General Assembly resolution 2018 (XX) of 1 November 1965 recommends, in principle II, that the minimum age should be 15 years. The desire to implement the right to free consent to marriage has also incidentally led to the prohibition of some practices similar to slavery to which women were subjected (article 1, paragraph (*c*), of the 1956 Supplementary Convention on the Abolition of Slavery) and to the requirement that certain procedures, including publicity and the presence of witnesses, be followed for the solemnization of a marriage (article 1, paragraph (1), of the 1962 Convention on Consent to Marriage, Minimum Age for Marriage and Registration of Marriages).

8. Several provisions stress the importance of the family, which is often described as the "fundamental group unit of society" (article 16 of the Universal Declaration) and proclaim the right of the family as such to protection. The concepts of family, procreation and childhood are closely linked in several provisions. For example, paragraph 16 of the Proclamation of Teheran states in one sentence that "the protection of the family and of the child remains the concern of the international community", and article 10 of the International Covenant on Economic, Social and Cultural Rights stresses that the "widest possible protection and assistance should be accorded to the family", particularly "while it is responsible for the care and education of dependent children". However, none of the instruments that have been studied explicitly states that procreation is the purpose or necessary consequence of family union.

The "right to decide freely and responsibly on the number and spacing of children"

Formulation of the concept

9. Particularly since 1966, this principle has been proclaimed in various recommendations adopted by or under the auspices of the United Nations.[7] Particular reference should be made in this connexion to General Assembly resolution 2211 (XXI) of 17 December 1966 on population growth and economic development; paragraph 16 of the Proclamation of Teheran and resolution XVIII of the International Conference on Human Rights held at Teheran in 1968; article 4 and article 22, paragraph (*b*), of the Declaration on Social Progress and Development (General Assembly resolution 2542 (XXIV) of 11 December 1969); and section II C, paragraph 4, of the programme of concerted international action for the advancement of women (General Assembly resolution 2716 (XXV) of 15 December 1970).

10. The preamble of resolution 2211 (XXI) of 17 December 1966 on population growth and economic development refers to a "principle" to which States should give "due regard" in their population policies, to be formulated by them in full sovereignty. In this resolution, the determination of the number of children by families is not described as a "right". In the programme of concerted international action for the advancement of women (1970), the General Assembly declares one of the "minimum targets to be achieved during the Second United Nations Development Decade" to be "making available to all persons who so desire the necessary information and advice to enable them to decide freely and responsibly on the number and spacing of their children" (section II C, paragraph 4).

11. In other instruments, the determination of the number and spacing of children is presented as being a "right". Paragraph 16 of the Proclamation of Teheran and operative paragraph 3 of resolution XVIII of the Conference on Human Rights refer to a "basic human right", a term which was endorsed by many delegates in their statements at the Conference.[8] The Declaration on Social Progress and Development of 1969 refers to "the exclusive right" of parents (article 4) and to the "right" of families (article 22, paragraph (*b*)). The

[7] This right was also the subject of a declaration, dated 10 December 1966, signed by 30 Heads of State or Government, which is referred to in the third paragraph of the preamble of resolution XVIII of the International Conference on Human Rights. See *United Nations Population Newsletter*, April 1968, p. 44.

[8] See *Summary Records of the First to Thirteenth Meetings of the Second Committee of the International Committee of Human Rights, Teheran, 25 April-9 May 1968*, United Nations document, A/CONF.32/C.2/SR.1-13.

General Assembly recommended that the Declaration be used as "a common basis for social development policies".

Persons and authorities concerned in the determination of the number and spacing of children

12. In some instruments, it is stated that decisions on this question should be made by "the family". Reference should be made in this connexion to the preamble of General Assembly resolution 2211 (XXI) of 17 December 1966 on population growth and economic development, and to article 22, paragraph (*b*), of the Declaration on Social Progress and Development of 1969.

13. The word "parents" was used in formulating paragraph 16 of the Proclamation of Teheran (1968) and also in article 4 of the Declaration on Social Progress and Development. In respect of the latter provision, it should be noted that the word "parents" was introduced by the Third Committee of the General Assembly, in preference to the word "family", which appeared in the draft of the Commission for Social Development.[9] During the discussion, it was stated, among other things, that in determining the number of children, the right of the parents, as the persons principally concerned and responsible, should prevail over the opinions of other members of the family (ascendant and collateral relatives), although the welfare of the family as a whole should be taken into consideration.[10]

14. Very close in meaning to the word "parents" is the term "couples", used by the Conference at Teheran in its resolution XVIII One of the main reasons for this choice appears to have been the wish to include, at least by implication, the right to have no children, if so desired.[11] It is also worth noting that the adjective "married", which had been suggested in the course of the debate to qualify the word "couples", was not used by the sponsors, nor did it form part of the resolution as adopted by the Conference, on the report of its Second Committee.[12]

15. All the provisions referred to above, regardless of their differences, appear to be based on the concept of a right exercised in common by a number of persons.[13] Another formula appeared in section II C, paragraph 4, of the Programme of Concerted International Action for the Advancement of Women, adopted by the General Assembly in 1970 (resolution 2716 (XXV), annex). This text sets out as one of the "minimum targets to be achieved during the Second United Nations Development Decade" making available "to all persons who so desire the necessary information and advice to enable them to decide freely and responsibly on the number and spacing of their children". The records of the twenty-third session of the Commission on the Status of Women show that the sponsors replaced the word "couples" by the expression "all persons who so desire", principally to extend the scope of the article to cover the situation of the unmarried mother[14] Paragraph 4 of section II C was adopted by the Third Committee without any discussion of this particular point At the same time, the Assembly stressed, in one of the general clauses preceding the programme, that the family, as the corner-stone of society, must be protected.

16. The records of the preparatory work on the above-mentioned instruments contain few clear indications as to the person or authority whose opinion should prevail in the event of a disagreement between the couple or members of the family

17. In the Third Committee of the General Assembly and in the Commission on the Status of Women, the view was expressed that, in such a case, the final decision should rest with the wife, as the person most concerned, after consultation with her husband[15]

18. Various United Nations organs have, on a number of occasions, discussed whether, or to what extent, authorities outside the family would be entitled to intervene in determining the number of children During the discussion on article 4 of the Declaration on Social Progress and Development, a number of representatives in the Third Committee maintained that the right of the parents could not be considered in isolation from the objectives of economic and social development, particularly in developing countries Such considerations could involve a certain supervisory right or even certain persuasive activities on the part of the State in respect of human fertility.[16] Other representatives, on the other hand, were of the opinion that that was an "exclusive" right of the parents, which could not be subjected to any outside interference or pressure.[17] The Third Committee of the General Assembly adopted the term

[9] See *Official Records of the General Assembly, Twenty-third Session, Annexes*, agenda item 50, document A/7374; and [illegible]

[illegible] Social Progress and Development there are a number of differences in the use of certain terms, since article 4, under the heading "Principles", contains the word "parents", whereas article 22, paragraph (*b*), under the heading "Means and methods", uses the term "family". A number of the statements made during the discussion leading up to the adoption of article 22, paragraph (*b*), seem to indicate that the word "family" in this article was considered as a synonym of or very close approximation to the term "parents". (See *ibid., Twenty-fourth Session, Third Committee*, 1682nd and 1683rd meetings)

[11] See foot note 8 above.

[12] The oral proposal made by India is contained in A/CONF 32/C 2/SR 1-13, see foot-note 8 above. The text of the resolution is contained in *Final Act of the International Conference on Human Rights*, chap III, resolution XVIII.

[13] See, for example, *Official Records of the General Assembly, Twenty-fourth Session, Third Committee*, 1682nd meeting

[14] *Official Records of the Economic and Social Council, Forty-eighth Session, Supplement No 6* chap III.

[15] See, for example, *Official Records of the General Assembly, Twenty-fourth Session, Third Committee*, 1683rd meeting; *ibid., Twentieth Session, Second Committee*, 1016th meeting, para 21.

[16] *Ibid , Twenty-third Session, Third Committee*, 1600th and 1601st meetings.

[17] *Ibid* , 1601st meeting, para. 4

"exclusive right" by a vote of 28 to 25 with 25 abstentions. [18] It is clear from the context of the Declaration, however, that this clause would in no way run counter to the dissemination of information to education or to the provision of services and means offered to parents to enable them to enjoy true freedom of choice in this matter. [19] The word "exclusive", qualifying the "right of the parents" to determine the number of children, does not appear in the other relevant instruments.

The concept of responsibility as concerns determination of the number and spacing of children

19. In the texts adopted at the Conference at Teheran and in all the relevant instruments adopted subsequently, the concept of responsibility is linked to that of freedom. The debates offer no precise indication as to the legal or moral nature of this responsibility, nor as to the institutions and procedures that might be envisaged in order to bring about its exercise. However, various opinions were expressed on the purpose and raison d'être of this responsibility.

20. Many speakers emphasized the relationship between demographic development and the effective enjoyment of economic and social rights, and the need for responsible action by those concerned in order to maintain optimum population. [20] Such considerations are reflected in paragraphs 1 and 2 of resolution XVIII of the Conference on Human Rights. Some representatives, while recognizing the importance of those considerations, were of the opinion that a reduction in fertility would not automatically result in an increase in the level of living, but that demographic policy should be accompanied by a series of other economic and social measures. [21]

21. During the debates at the United Nations, this link between fertility and the enjoyment of economic and social rights and human rights in general was emphasized at various levels, in particular at the level of the couple. The opinion was expressed that parents were perfectly entitled to decide how many children they had, bearing in mind, in particular, their joint desire for well-being. [22]

22. Within the couple, special attention was given to the status of women and their rights. Emphasis was laid on the links between family planning, on the one hand, and, on the other, the right of women to health and well-being, to develop their personalities through education, to engage in an occupation of their own free choice and to leisure. [23] Thus, in section II C, paragraph 4, of the Programme of Concerted International Action for the Advancement of Women, the General Assembly mentioned the possibility of access to "information on the ways in which women can benefit from family planning". The work of the Commission on the Status of Women on the relationship between family planning and the advancement of women has led, among other things, to the adoption by the Economic and Social Council of resolution 1326 (XLIV), to the preparation of a wide-ranging study and to the organization of several seminars on the subject. [24]

23. In the opinion of many representatives, the concept of responsibility in that field should be based on the right of children, without discrimination, to parental love, well-being and education recognized in the Declaration of the Rights of the Child, proclaimed by the General Assembly on 20 November 1959. During the debates at the Conference at Teheran and at other meetings, various speakers appeared to be of the opinion that, as far as parents were concerned, this responsibility towards their own children should prevail over all other considerations in determining the number and spacing of births. [25] In this connexion, mention should also be made of the formula used in various instruments, for example in article 6, paragraph 2, of the Declaration on the Elimination of Discrimination against Women, according to which the interest of the child should prevail in all matters concerning the child within the family.

24. Frequent reference was made, beyond the family sphere, to the responsibilities towards society and the country; [26] in that connexion, specific mention was made of article 29 of the Universal Declaration of Human Rights. According to several speakers it was necessary, particularly in the developing countries, to influence human fertility through non-coercive measures in order to attain and maintain the optimum population necessary for the economic and social development of the entire country. [27] In that connexion, it should be pointed out that many instruments recognize the right of States to adopt whatever demographic policy they deem advisable, bearing in mind their own needs and views as concerns development, on the basis of respect for human rights. These instruments include the preamble of General Assembly resolution 2211 (XXI)

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[18] *Ibid.*, para. 5.

[19] See the Declaration on Social Progress and Development (General Assembly resolution 2542 (XXIV)), article 22 (*b*). See also, for example, *Official Records of the General Assembly, Twenty-fourth Session, Third Committee,* 1682nd meeting, para. 15.

[20] See foot-note 8 above; see also *Official Records of the General Assembly, Twenty-third Session, Third Committee,* 1601st meeting.

[21] See foot-note 8 above.

[22] See, for example, *Official Records of the General Assembly, Twenty-fourth Session, Third Committee,* 1682nd and 1683rd meetings.

[23] See foot-note 8 above; see also *Official Records of the General Assembly, Twenty-third Session, Third Committee,* 1600th meeting; *ibid., Twenty-fourth Session, Third Committee,* 1683rd meeting; *ibid., Twentieth Session, Second Committee,* 1016th meeting.

[24] See *Official Records of the Economic and Social Council, Forty-eighth Session, Supplement No. 6,* paras. 106-118 and resolution 7 (XXIII), and *ibid., Fifty-second Session, Supplement No. 6,* paras. 138-141 and resolution 6 (XXIV).

[25] See foot-note 8 above.

[26] See, for example, *Official Records of the General Assembly, Twenty-third Session, Third Committee,* 1601st meeting; and *ibid., Twenty-fourth Session, Third Committee,* 1683rd meeting.

[27] *Ibid., Twenty-third Session, Third Committee,* 1600th and 1601st meetings.

of 1966, resolution XVIII of the Conference at Teheran in 1968, article 22, paragraph (*b*), of the Declaration on Social Progress and Development of 1969, paragraph 65 of the International Development Strategy for the Second United Nations Development Decade (General Assembly resolution 2626 (XXV) of 1970), and principle 16 of the Declaration of the United Nations Conference on the Human Environment held at Stockholm in 1973. [28] This last principle, in particular, states clearly that demographic policies must respect "basic human rights". This formula can be compared with the opinions expressed by various sponsors of resolution XVIII of the International Conference on Human Rights as reported in the summary records of the meetings of the Second Committee of that Conference (see paragraph 11 above).

25. One important aspect of the problem of the responsibility of the public authorities as concerns procreation was the subject of a rule of international law contained in article II, paragraph (*d*), of the 1948 Convention on the Prevention and Punishment of the Crime of Genocide. That article states specifically that "imposing measures intended to prevent births within the group" constitutes an act of genocide when such measures are taken "with intent to destroy, in whole or in part, a national, ethnical, racial or religious group, as such". Article III of the Convention states that conspiracy to commit genocide, direct and public incitement to commit and attempts to commit genocide and complicity in genocide shall be punishable, as well as the act of genocide itself. As the *Ad Hoc* Working Group of Experts on the treatment of political prisoners in South Africa, which was established under resolution 2 (XXIII) of the Commission on Human Rights, pointed out in its report, [29] it is clear from the preparatory work for the Convention that the intention to destroy the group as such (and not only a particular individual or family belonging to the group) is an essential component of the crime of genocide. However, it would probably be enough for the possibility of destruction to be noted and approved (*dolus eventualis*). According to the Convention, penal responsibility would exist, even if the act failed to achieve its end—the destruction of the group. Moreover, the provision requires that the measures be coercive.

26 Going beyond the framework of genocide, the question of the free consent of the persons concerned to measures affecting their fertility has been considered repeatedly by the United Nations. Article 7 of the International Covenant on Civil and Political Rights, which states that "no one shall be subjected without his free consent to medical or scientific experimentation", was adopted expressly in order to prevent a recurrence of the atrocities perpetrated against the human "guinea-pigs" in the Nazi concentration camps. [30] However, as the Secretary-General stated in 1951, in a report on the fate of the survivors of concentration camps, [31] the judgement on "the medical experiments" handed down by one of the United States military tribunals at Nurnberg following the Second World War, demonstrated that those criminal experiments had included numerous cases of forced sterilization. [32] The question of free consent to medical treatment was again examined by the General Assembly in the context of article 12 of the Covenant on Economic, Social and Cultural Rights, relating to health· it was decided that a reaffirmation of the principle contained in article 7 of the Covenant on Civil and Political Rights was not necessary. [33]

Dissemination of information and educational activities concerning the number and spacing of children

27. Resolution XVIII of the Conference on Human Rights held at Teheran in 1968 is the first of the instruments studied in which the couple's right to "education and information" relative to the number and spacing of their children is expressly stated A similar idea is found in article 22, paragraph (*b*), of the Declaration on Social Progress and Development, which recommends the provision to families of the "knowledge" necessary to enable them to exercise their right to determine freely and responsibly the number and spacing of their children In section II C, paragraph 4, the programme of concerted international action for the advancement of women recommends that such "information ... including information on the ways in which women can benefit from family planning" be made available to all persons who desire it.

28 Several speakers maintained that that right to information was an essential corollary of the right to decide freely and responsibly on the number and spacing of children. [34] Mention should be made here of the general United Nations standards on freedom of information contained in article 19 of the Universal Declaration of Human Rights and in article 19 of the International Covenant on Civil and Political Rights In the Universal Declaration of Human Rights, article 19 on freedom of information is, like the other articles, subject to the general restrictive provisions of article 29 on the duties of the individual to the community. As to the rights embodied in article 19 of the Covenant, in addition to the fact that they may be derogated from in time of public emergency (article 4), exercise of them carries

[28] *Report of the United Nations Conference on the Human Environment* (United Nations publication, Sales No. 73 II A 14)

[29] E/CN 4/984/Add 18, paras 23-30 The General Assembly commended the Group on its report in resolution 2714 (XXV)

[30] *Official Records of the General Assembly, Tenth Session, Annexes* agenda item 28 (part II), document A/2929, chap VI, para 14

[31] *Official Records of the Economic and Social Council, Twelfth Session*, "Progress report by the Secretary-General on the plight of survivors of concentration camps" (E/1915), paras 6-8

[32] *Trials of War Criminals before the Nürnberg Military Tribunals*, vol II, "The medical cases", pp. 174-182

[33] *Official Records of the General Assembly, Eleventh Session, Annexes*, agenda item 31, document A/3525, para. 155

[34] See foot-note 8 above; and *Official Records of the General Assembly, Twenty-fourth Session, Third Committee*, 1683rd meeting

with it "special duties and responsibilities" with a view to ensuring "respect of the rights or reputations of others" and "the protection of national security, or of public order (*ordre public*), or of public health or morals".

29. With respect to freedom of information on family planning, the question of restrictions was taken up by the General Assembly in the course of the debate on the programme of concerted international action for the advancement of women. An amendment, proposed by Saudi Arabia, was adopted whereby such information would be "based on valid and scientific expertise, with due regard to the risks that may be involved". During the discussion, [35] some representatives contended that, as drafted, the amendment could result in undue interference in the freedom of parents. The sponsor of the amendment, supported by the majority of representatives, maintained that the requirements of public policy (*ordre public*) concerning maternal and child health must be recognized.

30. Under resolution XVIII of the Conference on Human Rights, couples have the right not only to adequate "information", but to adequate "education" in the matter of family planning. Some of the representatives at the Conference at Teheran emphasized the importance of the educational aspect of family planning activities, including, in their opinion, appropriate sexual education. [36]

31. On these questions, the general United Nations standards on the right to education, including those in article 26 of the Universal Declaration of Human Rights, article 18, paragraph 4, of the International Covenant on Civil and Political Rights, article 13 of the International Covenant on Economic, Social and Cultural Rights, and principle 7 of the Declaration of the Rights of the Child, will come to mind. In various forms, those instruments recognize, in particular, the prior right of parents to choose, if not the general education, at least the religious and moral education to be given to their children in conformity with their own convictions. In the discussion in the Third Committee on the Universal Declaration of Human Rights, it was acknowledged, however, that this right of parents is subject, like other rights, to the restrictions stipulated in article 29 of the Declaration. It may be recalled, too, that article 13 of the International Covenant on Economic, Social and Cultural Rights refers to "such minimum educational standards as may be laid down or approved by the State".

32. There is no indication in the debate of the nature and scope of possible government responsibility in giving effect to the right of those concerned to necessary family planning knowledge. Literally, the formulae used in the Declaration on Social Progress and Development and in the programme of concerted international action for the advancement of women appear to invite the competent authorities to continue their efforts to ensure, so far as possible and in accordance with methods they deem appropriate, that those concerned shall have access to such knowledge; these clauses do not appear, however, to imply that the authorities should necessarily, of their own accord, disseminate such information or organize such education.

Provision of services and access to means for determining the number and spacing of children

33. In article 22, paragraph (*b*), of the 1969 Declaration on Social Progress and Development, the General Assembly for the first time mentioned "the provision to families of the knowledge and means to enable them to exercise their right to determine freely and responsibly the number and spacing of their children". Some speakers criticized the word "means" as opening the door to all sorts of undue interference by the authorities in family matters. The majority of representatives, on the other hand, considered it essential to maintain that concept, the sole purpose of which, in their opinion, was to facilitate the parents' freedom of choice. [37] Some of the latter—supporters of the word "means"—indicated, further, that in their understanding the notion of the free choice of parents excluded abortion, [38] and that the dissemination of appropriate information and techniques would in fact lead to a reduction in the number of abortions and, consequently, in maternal and infant mortality. [37]

34. The word "advice" in section II C, paragraph (4), of the programme of concerted international action for the advancement of women was not the subject of wide comment during the debate; probably, however, it goes beyond the word "information", which also occurs in that paragraph.

UNITED NATIONS STANDARDS CONCERNING THE RELATIONSHIP BETWEEN HUMAN RIGHTS AND VARIOUS QUESTIONS RELATING TO HUMAN MORTALITY AND MORBIDITY

35. The United Nations norms expressing the universal aspiration towards reducing mortality and morbidity rates and prolonging life expectancy deserve to be studied as carefully as the preceding norms. The advances made by medicine in the fight against disease, and the progress made in dietetics and other sciences, are in fact the most remarkable aspects of the demographic developments which have taken place in many countries over the past 10 years.

36. Account will be taken in particular of the following provisions, which are listed in chronological order:

(*a*) Article 6 of the Charter of the Nürnberg International Military Tribunal of 8 August 1945, the

[35] *Official Records of the General Assembly, Twenty-fifth Session, Third Committee,* 1818th and 1819th meetings.

[36] See foot-note 8 above.

[37] *Official Records of the General Assembly, Twenty-fourth Session, Third Committee,* 1682nd meeting.

[38] *Ibid., Twenty-third Session, Third Committee,* 1599th meeting.

principles of which were affirmed by General Assembly resolution 95 (I) of 11 December 1946;

(*b*) Article II (*a*) to (*d*) of the Convention on the Prevention and the Punishment of the Crime of Genocide;

(*c*) Articles 3 and 25 of the Universal Declaration of Human Rights;

(*d*) Articles 2, 4 and 5 of the Declaration of the Rights of the Child;

(*e*) Article 5 (*e*) (iv) of the International Convention on the Elimination of All Forms of Racial Discrimination;

(*f*) Article 6 of the International Covenant on Civil and Political Rights;

(*g*) Articles 11 and 12 of the International Covenant on Economic, Social and Cultural Rights,

(*h*) Articles 10 (*b*) and (*d*), 18 (*c*) and 19 of the Declaration on Social Progress and Development of 1969;

(*i*) Paragraphs (68) and (69) of the International Development Strategy of 1970,

(*j*) Articles 1, 2 and 7 of the Declaration on the Rights of Mentally Retarded Persons,

(*k*) The General Assembly resolutions on respect for human rights in armed conflicts, in particular, resolution 2676 (XXV) on the protection of civilians in time of war.

37 A number of instruments of the specialized agencies, in particular the constitutions of the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization and a number of International Labour Organisation norms on health and safety at work must be fully taken into consideration Also to be considered are WHO provisions that may have some relationship to questions concerning morbidity among different categories of the population, such as children, women, various ethnic groups, rural populations etc. As far as regional organizations are concerned, mention is made in particular of article 2 of the European Convention for the Protection of Human Rights and Fundamental Freedoms, articles 11 and 13 of the European Social Charter and article 4 of the American Convention on Human Rights as mentioned in paragraph 4 above. Lastly, the Hague Conventions of 1907 [39] and the four Geneva Conventions for the Protection of Victims of War, of 1949, [40] must be borne in mind.

Definition and protection of the right to life

38 During the debates which resulted in article 3 of the Universal Declaration, two amendments designed to make it clear that the article would apply "from the moment of conception" were submitted [41] Other representatives preferred a concise formulation without qualifications; and, in addition, some objected that such amendments could not be reconciled with certain national legislations. [42] The General Assembly, without taking up a position on the problem of abortion, preferred a very general formula. The discussions of article 6 of the International Covenant on Civil and Political Rights gave rise to similar exchanges of views. An amendment designed to protect the right to life "from the moment of conception" was rejected by 31 votes to 20, with 17 abstentions. Those in favour of the amendment had stressed, in particular, that the right as thus defined was protected in a number of countries and they felt it would be logical to bring the general definition of the right to life into line with the specific clause prohibiting the execution of a pregnant woman who is sentenced to death. Among the opposing arguments, it was pointed out that it was impossible to determine the exact moment of conception, that the amendment would raise delicate questions relating to the rights and duties of the medical profession, and that, in order to ensure the largest possible number of ratifications, it was preferable not to raise such a controversial matter in the Covenant [43] Reference may also be made here to the passages of chapter I which note that in the Declaration on Social Progress and Development (1969) the "exclusive right" of parents "to determine freely and responsibly the number and spacing of their children" was represented by the sponsors of that wording as not including the right to abortion [44]

39. The debates in the context of the Covenant concerning the limitations *ratione materiae* and *ratione personae* which should be applied to the principle of the right to life related above all to the question of the death penalty, which may be imposed by the competent courts only for the most serious crimes and is not applicable to minors below the age of 18 or to pregnant women Moreover, the Covenant specifies that nothing in the article shall be invoked to delay or to prevent the abolition of capital punishment

40 It will be recalled that international penal law solemnly condemned, as "war crimes", in particular the "murder . . . of civilian population of or in occupied territory [and] of prisoners of war or persons on the seas" (article 6 (*b*) of the Charter of the International Military Tribunal at Nurnberg) and, as "crimes against humanity", "murder, extermination .. committed against any civilian population, before or during the war, . . . in execution of or in connexion with any crime within the jurisdiction of the Tribunal" (article 6 (*c*) of the Charter of the International Military Tribunal at Nurnberg). [45] These principles of international law

[39] Carnegie Endowment for International Peace, J. B Scott, ed., *The Hague Conventions and Declarations of 1899 and 1907* (New York, Oxford University Press, 1915)

[40] United Nations, *Treaty Series*, vol 75

[41] E/CN 4/21

[42] E/CN 4/AC 2/SR.3

[43] *Official Records of the General Assembly, Twelfth Session, Annexes*, agenda item 33, document A/3764, paras 97 and 113

[44] *Ibid*, *Twenty-third Session, Third Committee*, 1599th meeting, and *ibid*, *Twenty-fourth Session, Third Committee*, [illegible]

vere affirmed by the General Assembly in resolution 95 I). Mention should also be made of the two articles that ire common to the four Geneva Conventions of 1949, elating to "grave breaches" of these treaties, which are lefined in a manner very similar to the Nürnberg rinciples. Under article II of the Convention on the Prevention and Prohibition of the Crime of Genocide, vhich applies both in time of peace and in time of war, ertain acts, including "killing members of the group" nd "deliberately inflicting on the group conditions of ife calculated to bring about its physical destruction in vhole or in part" shall be punished as crimes under nternational law if they are committed "with intent to lestroy, in whole or in part, a national, ethnical, racial r religious group, as such". This intentional element ppears to be essential, according to the preparatory vork, and it seems that *dolus eventualis* will suffice.[46]

41. The right to life of the handicapped, the infirm r persons suffering from incurable diseases, including nental illness, has often been considered by the United Nations. During the drafting of the Universal Declaration of Human Rights, a specific clause, based on a ext by the Inter-American Juridical Committee subnitted to the Commission on Human Rights, was roposed ensuring "the right to life of incurables, mbeciles and the insane" (document E/CN.4/2, lated 8 January 1947). The omission of these terms rom the final text does not appear to result in any way rom objections to the substance of the proposal, but ather from a concern to retain a fairly general formulaion. It would also appear that the debates were somevhat complicated because of the juxtaposition of hrases relating to "the right to life from the moment f conception" in these same amendments. The Decaration on the Rights of Mentally Retarded Persons, f 20 December 1971, confirms the right of such persons o life and to the necessary care. In discussing these uestions, the Commission on Human Rights and the Third Committee were fully aware of the murders and nassacres by the Nazis of persons suffering from hysical or mental diseases and handicaps that were egarded as incurable, for the sole purpose of reducing he number of "useless eaters" or for alleged eugenic easons. These atrocities were punished by the Nürnberg nternational Military Tribunal as "war crimes" and 'crimes against humanity".[47]

Rights relating to nutrition

42. Article 25 of the Universal Declaration menions, among many other elements of the right to an dequate level of living, the right to adequate food. In rticle 11 of the International Covenant on Economic, Social and Cultural Rights, a further clarification was nade by stressing "the essential importance of internaional co-operation based on free consent" in implementing the right to adequate food. Moreover, the General Assembly adopted at its eighteenth session in 1963, in response to an appeal from the Director-General of FAO, an additional paragraph to article 11 of the Covenant recognizing "the fundamental right of everyone to be free from hunger".[48] Among the specific programmes designed to guarantee this right, the full use of technical and scientific knowledge and the development or reform of agrarian systems were by general consent mentioned in paragraph 2 of article 11. A number of representatives stressed the importance they attached to the implementation of programmes designed to ensure "an equitable distribution of world food supplies in relation to need". This last provision was qualified by a phrase recognizing the problems of both food-importing and food-exporting countries. It was, nevertheless, made clear that this phrase could not be interpreted as implying that economic interests should prevail over humanitarian and social considerations.[49]

43. The Declaration on Social Progress and Development of 1969 reproduced these principles, which, among others, should serve as "a common basis for social development policies". Under the heading, "Objectives", the Declaration mentioned in article 10 (*b*) the elimination of hunger and malnutrition. In the section "Measures and methods", article 18 (*b*) and (*c*) recommended the implementation of democratic agrarian reforms in order to boost agricultural production and also the equitable distribution of food.

44. Paragraph (69) of the International Development Strategy of 1970 provides that the Governments of the developing countries should make an effort, through appropriate programmes and with international assistance if necessary, towards meeting their nutritional requirements, *inter alia*, by stepping up the production and distribution of high-protein foods.

45. Perhaps even more than other economic and social rights, the right to adequate food enshrined in United Nations instruments is closely linked to the right of a people not to "be deprived of its own means of subsistence" proclaimed in paragraph 2 of article 1 of the International Covenant on Economic, Cultural and Social Rights. The General Assembly has declared in resolution 1803 (XVII) that "the right of peoples and nations to permanent sovereignty over their natural wealth and resources must be exercised in the interest of their national development and of the well-being of the State concerned."

Rights relating to health

46. Article 25 of the Universal Declaration proclaims, among others, the right of everyone to a level of living adequate for his health and the right to the necessary medical care. This general text was found

[46] On these matters, see *inter alia* E/CN.4/984/Add.18, aras. 23-30.

[47] *The Judgement of the International Military Tribunal for he Trial of German Major War Criminals, Nuremberg 1946* London, His Majesty's Stationery Office, Cmd. 6964), p. 60.

[48] *Official Records of the General Assembly, Eleventh Session, Annexes*, agenda item 31, document A/3525, para. 133; *ibid., Third Committee*, 742nd and 743rd meetings.

[49] *Ibid., Eighteenth Session, Annexes*, agenda item 48, paras. 89, 90, 101 and 103.

preferable to certain more detailed drafts which specified in particular the duty of States to take measures designed to protect health and prevent disease.

47. Under the terms of paragraph 1 of article 12 of the International Covenant on Economic, Social and Cultural Rights, the States Parties recognize the right of everyone "to the enjoyment of the highest attainable standard of physical and mental health". This formulation is less detailed than the text proposed by the Commission on Human Rights, inspired by the Constitution of WHO, in which health was defined as "a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity". Although a number of speakers declared their support for such an extended concept of health, stressing, *inter alia*, the importance of its social aspect, the majority of the General Assembly apparently was of the opinion that there was a risk that any definition would be incomplete.[80] Paragraph 2 of article 12 describes certain types of steps which should be taken to achieve the realization of the right to health, including "the creation of conditions which would assure to all medical service and medical attention in the event of sickness".

48. The Declaration on Social Progress and Development (1969) deals twice with rights relating to health. Article 10 (*d*) proclaims as one of the "objectives" to be pursued respect for the highest standards of health and the provision of health protection for the entire population, "if possible free of charge". In the section, "Means and methods", article 19 (*a*) of the Declaration refers to "The provision of free health services to the whole population".

49 In the context of the International Development Strategy (1970), paragraph (68) provides, *inter alia*, for the continuation of a concerted international effort to eradicate by the end of the Second Development Decade, from as many countries as possible, at least one of the diseases that still seriously afflict mankind.

50. The United Nations has adopted special provisions relating to the health and well-being of certain classes of persons, in particular women in pregnancy, children and the physically and mentally handicapped

51 Lastly, it should be mentioned that in resolution 2842 (XXVI) of 18 December 1971 the General Assembly requested the Secretary-General to prepare, in co-operation with interested specialized agencies, a report suggesting guidelines for national policies and international action related to the needs and the role of the elderly and the aged in society in the context of over-all development.

United Nations standards concerning the relationship between human rights and migration

52. The problems relating to migration, both at the national and at the international level, have been the object of frequent discussions at the United Nations. The following instruments, in particular, contain provisions on the subject·

(*a*) Universal Declaration of Human Rights· articles 2, 4, 9, 13, 14, 15, 21, 23 and 29;

(*b*) International Covenant on Civil and Political Rights. articles 1, 2 (1), 4, 8, 9, 12, 13, 22, 25, 26 and 27;

(*c*) International Covenant on Economic, Social and Cultural Rights: articles 1, 2. 7 (*a*) (i), 8 (1) (*a*), and 25;

(*d*) International Convention on the Elimination of All Forms of Racial Discrimination. articles 1 (2) and (3), 5 (*d*) (i) and (ii), and 6,

(*e*) Declaration on the Elimination of Discrimination against Women· articles 6 (c) and 8;

(*f*) Charter of the International Military Tribunal, Nurnberg, article 6;

(*g*) Convention on the Prevention and Punishment of the Crime of Genocide. article II (*e*),

(*h*) Slavery Convention· articles 2 and 3;

(*i*) Supplementary Convention on the Abolition of Slavery, the Slave Trade and Institutions and Practices Similar to Slavery articles 1 and 3,

(*j*) Convention for the Suppression of the Traffic in Persons and of the Exploitation of the Prostitution of Others articles 1 and 17,

(*k*) Convention on the Reduction of Statelessness. article 7 (3), (4) and (5) and article 9,

(*l*) Convention relating to the Status of Stateless Persons: articles 4, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 (1), 22 (2), 23, 24, 26, 28, 29 (1), 29 (2), 31 and 32;

(*m*) Convention relating to the Status of Refugees. articles 4, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 (1), 22 (2), 23, 24, 26, 28, 29 (1), 29 (2), 31, 32, 33 and 34;

(*n*) Declaration on Territorial Asylum articles 1, 2 and 3,

(*o*) Declaration of the Rights of the Child article 9,

(*p*) Declaration on Social Progress and Development. articles 1, 8, 14 (*b*), 17 (*a*) and (*c*) and 19 (*c*),

(*q*) International Development Strategy for the Second United Nations Development Decade (General Assembly resolution 2626 (XXV)), paragraphs 66, 71 and 75;

(*r*) General Assembly resolutions 2320 (XXII), 2417 (XXIII) and 3017 (XXVII) concerning the "brain-drain";

(*s*) General Assembly resolution 2920 (XXVII) on the Exploitation of labour through illicit and clandestine trafficking,

(*t*) Declaration of the United Nations Conference on the Human Environment, Stockholm, 16 June 1972, principles 15 and 16.

53. Other international instruments in the field of migration and human rights include.

(*a*) The ILO Convention No 97 co cernin ra-

[80] *Ibid*, *Eleventh Session, Annexes*, agenda item 31, document A/3525, paras 145 and 151

tion for Employment (Revised 1949): articles 6, 8 and annex II, articles 10 and 11; [51]

(*b*) The 1949 ILO Convention on Freedom of Association and Protection of the Right to Organize: article 2; [51]

(*c*) The UNESCO Convention against Discrimination in Education: article 3 (*c*); [52]

(*d*) The 1949 Geneva Convention Relative to the Protection of Civilian Persons in Time of War: article 49;

(*e*) The European Convention on Human Rights and Fundamental Freedoms;

(*f*) The Protocol No. 4 to the European Convention on Human Rights: articles 2, 3 and 4;

(*g*) The European Social Charter, 1961: articles 12 (4), 13 (4), 18 and 19 and appendix;

(*h*) The Treaty Establishing the European Economic Community: articles 36, 117 and 118; [53]

(*i*) The American Convention on Human Rights: article 22.

Human rights provisions concerning international migration

General principles

54. The right of everyone to leave any country, including one's own, is set forth in paragraph 2 of article 13 of the Universal Declaration of Human Rights, in paragraph 2 of article 12 of the International Covenant on Civil and Political Rights, in articles 2 and 3 of Protocol No. 4 to the European Convention on Human Rights and Fundamental Freedoms and in paragraphs 2 and 3 of article 22 of the American Convention on Human Rights.

55. The inclusion in the Universal Declaration of a general right to leave any country was accepted by the Commission on Human Rights. [54] It rejected a proposal that any reference to such right be deleted on the ground that it would encourage emigration. In the course of the discussion it was recognized that the right to emigrate could not be effective without facilities for immigration and transit on the part of other countries. It was therefore recommended that that corollary be considered as a matter of international interest and that members of the United Nations should co-operate by taking as far as possible the necessary measures to accord such facilities (E/CN.4/57). However, when the Commission adopted the final draft of the article at its third session, it was pointed out that nothing in the article related to a right to immigration, which remained a field regulated by the national legislation of each country (E/CN.4/SR.55).

56. Although several countries expressed misgiving about the inclusion in the Declaration of an unrestricted right to emigrate without any reservations, it was eventually agreed by the Drafting Committee and by the Commission not to include any reservations in article 13, as the Declaration's general article on restrictions (article 29) would afford adequate safeguards for the general prerogatives of the community and the State (E/CN.4/95).

57. An amendment introduced in the Third Committee to make the right subject to the procedure laid down in the laws of each country was not accepted, [55] as it was considered that the national laws should conform to the Declaration and not vice versa, and that the principle of freedom of movement did not prevent States from promulgating laws or ordinances to cope with questions of public order or public health under article 29 of the Declaration. [56]

58. On the other hand, article 12 of the International Covenant on Civil and Political Rights does contain in paragraph 3 a limitation clause to the effect that the rights enunciated in paragraphs 1 and 2 (i.e., freedom of movement and of residence within the territory of a State, and freedom to leave any country, including one's own) may only be subject to restrictions provided by law and necessary to protect "national security, public order (*ordre public*), public health or morals or the rights and freedoms of others and (which) are consistent with the other rights recognized in the present Covenant".

59. Among the restrictions that various representatives in the Commission on Human Rights mentioned as being legitimate were those which might be imposed in a national emergency, in epidemics, for the control of prostitution, [57] on immigrants as a temporary measure, on migrant workers in certain cases or on indigenous population in certain circumstances for their own protection. It was agreed that the right to leave any country could not be claimed in order to escape legal proceedings, such obligations as national service, and the payment of fines, taxes or maintenance allowances. In connexion with the proviso that any restriction should be consistent with the other rights recognized in the Covenant, attention was drawn to the importance of the provisions on non-discrimination in paragraph 1 of article 2 as applied to this article. On the other hand, some members of the Commission regarded the wording of the limitation clause in article 12 of the Covenant as too vague and capable of leading to abuse. [58]

60. Although no general right of immigration exists in any instrument of the United Nations, the right of

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[51] International Labour Organisation, *Conventions and Recommendations, 1919-1966* (Geneva, 1966).

[52] United Nations Educational, Scientific and Cultural Organization, *Records of the General Conference, Eleventh Session, Resolutions,* section B.I.

[53] United Nations, *Treaty Series,* vol. 296.

[54] *Official Records of the Economic and Social Council, Third Year, Seventh Session, Supplement No. 2,* document E/800.

[55] *Official Records of the General Assembly, Third Session, Annexes,* agenda item 58, document A/777.

[56] *Ibid., Third Committee,* 120th meeting.

[57] In this connexion, see article 17 of the Convention for the Suppression of the Traffic in Persons and of the Exploitation of the Prostitution of Others.

[58] *Official Records of the General Assembly, Tenth Session, Annexes,* agenda item 28 (part II), document A/2929, chap. VI, paras. 51-60.

everyone to "return" to "his" country was included in paragraph 2 of article 13 of the Universal Declaration of Human Rights. The parallel provision in the Covenant is in paragraph 4 of article 12 according to which "no one shall be arbitrarily deprived of the right to enter his own country". Similar provisions are to be found in Protocol No. 4 of the European Convention on Human Rights (article 3) and in the American Convention on Human Rights (article 22).

61. It will be noted that unlike the Declaration, the Covenant uses the word "enter" instead of "return". This was done in order to include such cases as those of persons born abroad who had never been to the country of their nationality. Earlier drafts of this provision in the Covenant referred to the right of everyone to enter the "country of which he is a national". These last words were eventually replaced in the Commission by "his own country" in order to cover the cases of States where the right of "return" was governed not by rules of nationality but by permanent residence. [58]

62. Though the limitation clause in article 12 of the Covenant does not extend to the provision in paragraph 4, the word "arbitrarily" was added in the Third Committee in order to emphasize that the right to enter one's own country was not absolute. (The draft prepared by the Commission on Human Rights, on the other hand, recognized the possibility of exile provided it was not "arbitrary".) Some members were of the view that this right should not be subject to any restrictions. [59] The word "arbitrarily" was eventually adopted by 29 votes to 20, with 20 abstentions

63. The whole of article 12 is subject to the general derogation clause contained in article 4 of the Covenant, which authorizes States under certain conditions to adopt measures derogating from their obligations under the Covenant in time of public emergency.

Prohibition of discrimination

64. The right to leave any country, including one's own, and to return to one's country is recognized to everybody "without distinction of any kind such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status" (article 2, para. 1, of the Universal Declaration and of the International Covenant on Civil and Political Rights).

65. In addition, article 5 (*d*) (ii) of the International Convention on the Elimination of All Forms of Racial Discrimination imposes the obligation upon States parties to guarantee the right of everyone to leave any country, including one's own, and to return to one's country "without distinction as to race, colour, or national or ethnic origin".

66. Under the Declaration on the Elimination of Discrimination against Women, States are also enjoined to adopt all appropriate measures to ensure to women "the same rights as to men with regard to the law on the movements of persons" (article 6, para. 1 (c)).

Prohibition of expulsion or forced transfers of populations beyond the frontiers of a State

67. The forced transfer of persons for purposes of the slave trade as well as arbitrary exile are forbidden by articles 4 and 9 of the Universal Declaration of Human Rights, while the arbitrary expulsion of aliens is prohibited under article 13 of the International Covenant on Civil and Political Rights.

68. More specifically, article 6 of the Charter of the International Military Tribunal at Nurnberg classifies as war crimes, *inter alia*, "the deportation to slave labour or for any other purpose of civilian population in occupied territory", and includes in its definition of crimes against humanity the deportation of civilian population before or after the war, in connexion with a war crime against peace. Individual and mass forcible transfers as well as deportations of civilians are also prohibited under the Geneva Convention Relative to the Protection of Civilian Persons in Time of War

69 Under article II, paragraph (*e*), of the Genocide Convention, the forcible transfer of children of one group to another group with intent to destroy, in whole or in part, a national, racial or religious group is punishable as genocide. It may be added that no physical destruction is required for the commission of this crime. A forcible transfer of several children—not necessarily on a mass scale—to another group with the purpose of destroying, in whole or in part, the consciousness of the group to which the children belong suffices

70. The slave trade is specifically outlawed by the Slavery Convention of 1926 (articles 2 and 3) and made a criminal offence by article 3 of the Supplementary Convention of 1956. The traffic in persons for the purpose of prostitution is also outlawed by article 1 of the Convention for the Suppression of the Traffic in Persons and of the Exploitation of the Prostitution of Others and by article 8 of the Declaration on the Elimination of Discrimination against Women.

Special problems that arise in connexion with the right of nationals to leave their own country and to return to it

Exile and denationalization

71. The right of every person to leave his country and to return to it is closely linked with the questions of denationalization and of exile.

72. Article 9 of the Universal Declaration stipulates that "no one shall be subjected to arbitrary arrest, detention or exile". When the prohibition of exile was included in the text of article 9 by the Third Committee it was understood that the word "arbitrary" qualified also the term "exile", and an amendment providing for unqualified prohibition of exile was, in fact, rejected. [60]

[59] *Ibid., Fourteenth Session, Third Committee*, 954th-959th meetings

[60] *Ibid., Third Session, Third Committee*, 113th and 114th meetings.

73. The Covenant on Civil and Political Rights does not contain a prohibition of arbitrary exile, but simply stipulates in paragraph 4 of article 12 that "no one shall be arbitrarily deprived of the right to enter his own country". The draft prepared by the Human Rights Commission did contain such an express prohibition,[61] but, after a lengthy discussion in the Third Committee that provision was altered in favour of the present text.[62]

74. Apart from other consequences, the loss of nationality often entails the loss of the right to return to one's country. Arbitrary deprivation of nationality is prohibited under article 15 (2) of the Universal Declaration, while according to article 9 of the Convention on the Reduction of Statelessness (not yet in force), States parties may not deprive "any person or group of persons of their nationality on racial, ethnic, religious or political grounds". This Convention also provides in article 7 (3) that, subject to certain exceptions, departure or residence abroad shall not be regarded as grounds for depriving a national of a Contracting State of his nationality, so as to become stateless.

The "brain-drain"

75. The accelerated flow of trained personnel from developing to developed countries has been the object of discussion and increasing concern by the General Assembly. At its twenty-seventh session, the General Assembly by resolution 3017 (XXVII) invited the Secretary-General to undertake a study to assess the negative consequences of such outflow for the developing countries and to draft the guidelines for an action programme to be elaborated by the Committee on Science and Technology for Development in order to put an end to and reverse the flow "in conformity with the Universal Declaration of Human Rights".

Migratory labour

76. If the migration of highly trained personnel may hinder the economic and social development of the developing countries, the migration of foreign workers often leads to problems of exploitation and discrimination both in the method of their recruitment and conditions of transportation and in the treatment they meet within the country of destination.

77. The growing concern of the international community about the abuses to which migrant workers in transit are increasingly subjected led the General Assembly, in resolution 2920 (XXVII) of 15 November 1972, to ask the Commission on Human Rights to consider the question as a matter of priority and to request Governments to take or supervise the application of measures to put an end to discriminatory treatment of migrant workers while urging those Governments which had not yet done so to ratify at an early date ILO Convention No. 97 concerning Migration for Employment (revised 1949).

Human rights standards concerning the entry and departure of non-citizens and the right of asylum

78. While the right of non-citizens to leave the country in which they are has been recognized in both the Universal Declaration and the International Covenant on Civil and Political Rights, their right to enter a foreign country, and not to be expelled therefrom, has not received similar attention. However, some countries recognize the right of "return" of non-citizens who are permanent residents. The Treaty Establishing the European Economic Community provides in article 36 for the free movement of workers within the Community.

79. However, the arbitrary expulsion of an alien "lawfully in the territory of a State Party" is forbidden by article 13 of the Covenant, which prescribes that he can be expelled only "in pursuance of a decision reached in accordance with law" and that he shall be allowed, except for reasons of national security, to submit reasons against his expulsion and to have his case reviewed by a competent authority. It will be noted that this provision applies to any alien "lawfully in the territory of a State Party". An amendment to insert the word "established" after "lawfully" during the discussion of the article in the Third Committee was rejected, several members opposing it on the ground that it tended to narrow the scope of the article to a limited group of aliens.[63]

80. Similar provisions against arbitrary expulsion can be found in article 31, paragraph 2, of the Convention Relating to the Status of Stateless Persons, and in article 32, paragraph 2, of the Convention Relating to the Status of Refugees.

81. The Refugee Convention furthermore contains an emphatic provision in article 33 prohibiting *refoulement*, that is, the expulsion or return of a refugee to the frontier or territory where his life or religion would be threatened on account of his race, religion, nationality, membership of a particular social group or political opinion.

82. Convention No. 97 of the International Labour Organisation concerning Migrants for Employment (revised 1949), mentioned in General Assembly resolution 2920 (XXVII), imposes in article 8 restrictions on the right of a State to return to his country of origin a migrant for employment, who has been admitted on a permanent basis and members of his family authorized to accompany or join him, on the grounds that the migrant is unable to follow his occupation by reason of illness contracted or injury sustained subsequent to entry, at least after a maximum of five years from the date of admission has elapsed.

83. The right of everyone "to seek and enjoy in other countries asylum from persecution" is recognized by

[61] *Ibid., Tenth Session, Annexes,* agenda item 28 (part II), document A/2929, chap. VI, paras. 58-60.

[62] *Ibid., Fourteenth Session, Annexes,* agenda item 34, document A/4299, paras. 3-19.

[63] *Ibid.,* paras. 20-29.

article 14 of the Universal Declaration except in cases of prosecutions genuinely arising "from non-political crimes or from acts contrary to the purposes and principles of the United Nations".[64] When the draft article was being studied in the Third Committee the words "to enjoy" were added in the first paragraph in order to make it clear that an individual, who had been granted asylum into a country, should continue to benefit from his right of asylum and could not be arbitrarily expelled, though in the view of some members he could be subjected to certain restrictions imposed by the receiving State for reasons of national security or public order.[65]

84 The International Covenants do not contain any provision on the right of asylum During the discussion of article 13 of the Covenant on Civil and Political Rights several proposals to include this right were discussed and rejected While the principle of the desirability of States being generous in extending asylum to persecuted individuals was generally accepted, there was deep division concerning the desirability of translating this principle into a positive right [66]

85. The Declaration on Territorial Asylum adopted by the General Assembly in resolution 2312 (XXII), though mindful of the provisions in article 14 of the Universal Declaration, avoids the use of the word "right" except in paragraph 2 of article 1, when it declares that "the right to seek and to enjoy asylum" may not be invoked by any person suspected of having committed a crime against peace, a war crime or a crime against humanity. The Declaration in its preambular part recognizes that the grant of asylum is a humanitarian act which cannot be regarded as unfriendly by any other State, but further states in articles 1 (1) and (3) that the decision whether to grant asylum is an act of sovereignty of the State concerned.

86. Article 3, paragraph 1, of the Declaration on Territorial Asylum contains a prohibition against rejection at the frontier and against *refoulement* of persons entitled to seek asylum under article 14 of the Universal Declaration, including persons struggling against colonialism The only exception to this provision is "for overriding reasons of national security or in order to safeguard the population, as in the case of a mass influx of persons" (article 3, para 2). However, in these cases the State concerned shall consider the possibility of granting to the person concerned an opportunity of going to another country (article 3, para. 3).

87. The Refugee Convention in article 31 contains a provision somewhat related to the concept of asylum when it lays down that States Parties shall not impose penalties, on account of their illegal entry or presence, upon refugees who come from a territory in which their life or freedom is threatened, provided they present themselves without delay to the authorities and show good cause for their illegal entry or presence. States Parties in such cases can either regularize the status of such persons or must allow them a reasonable time and facilities to obtain admission into another country. The prohibition against *refoulement* contained in article 33 applies also to these cases.

Rights guaranteed to migrants in their country of settlement

Civil and political rights

88 From a reading of the Universal Declaration of Human Rights and of the International Covenant on Civil and Political Rights, and particularly of the non-discrimination clauses in paragraph 1 of article 2 of both instruments, it would appear to follow that the provisions contained therein, with the exception of political rights of the nature specified in article 21 of the Declaration and article 25 of the Covenant, extend *to everyone within the territory of a State, including* migrants.

Protection from racial discrimination

89. Article 6 of the Convention on the Elimination of All Forms of Racial Discrimination imposes on States Parties the obligation of affording to "everyone within their jurisdiction" effective protection and remedies against any acts of racial discrimination contrary to the Convention. Thus, it appears that a migrant is entitled to protection from, and to seek a remedy against, any act of racial discrimination of which he has been a victim, provided that such act cannot be characterized as a "distinction, exclusion, restriction or preference made by the State between citizens and non-citizens" under the reservation clause contained in article 1, paragraph 2, of the Convention

90. The General Assembly in resolution 2920 (XXVII) of 15 November 1973 requested Governments to take or supervise measures to put an end to discriminatory treatment of migrant workers and to ensure respect for the provisions of the International Convention on the Elimination of All Forms of Racial Discrimination.

Economic, social and cultural rights

91. It would appear that the provisions contained in the International Covenant on Economic, Social and Cultural Rights extend to immigrants who are not citizens of the country in which they live with the limitations and provisos laid down, *inter alia,* in articles 1, 2 (3) and 25. It will be recalled that article 2 (3) in particular allows developing countries to decide "to what extent they will guarantee the economic rights recognized in the Covenant to non [illegible]"

[66] *Ibid*, *Tenth Session*, *Annexes*, agenda item 28 (part II), document A/2929, chap VI, paras. 65-72 For a summary of the discussions on the right of asylum which took place in the Commission on Human Rights between 1947 and 1957, see E/CN 4/713 and E/CN 4/738 and Corr 2

92. Certain economic, social and cultural rights appear to be clearly recognized to immigrants. [67] Thus, the right to equal remuneration for work of equal value is guaranteed to everyone "without distinction of any kind" by article 7 (*a*) (i) of the Covenant; the right to join trade unions is recognized by articles 8 (1) (*a*) of the Covenant on Economic, Social and Cultural Rights, 22 of the Covenant on Civil and Political Rights and 23 of the Universal Declaration. [68] The right of all peoples "to live in dignity and freedom and to enjoy the fruits of social progress without distinction as to (*inter alia*) nationality", is set forth in article 1 of the Declaration on Social Progress and Development proclaimed by the General Assembly in resolution 2542 (XXV).

93. On the other hand, it would appear that migrants may not claim to constitute any ethnic, religious or linguistic minority within the meaning of article 27 of the Covenant on Civil and Political Rights. When this article was discussed in the Third Committee it was emphasized by many delegations representing countries of immigration that persons of similar background who entered their territories voluntarily through a gradual process of immigration could not be regarded as minorities and thus entitled to the special provisions of article 27, as this would endanger the national integrity of the receiving States. [69]

Special measures for the protection of migrant workers

94. Certain provisions in human rights instruments are specifically directed to the protection of migrant workers. Thus, the ILO Convention concerning Migration for Employment (revised 1949) in article 6 imposes the obligation upon States Parties to accord to immigrants the same treatment as to nationals in respect of: (*a*) remuneration, allowances and conditions of work; (*b*) membership of trade unions; (*c*) accommodation; (*d*) social security; (*e*) employment taxes, dues and contributions; and (*f*) legal proceedings relating to matters referred to in the Convention.

95. Annex II to this Convention "concerning Recruitment, Placing and Conditions of Migrants for Employment Recruited under Government Sponsored Arrangements for Group Transfer" contains provisions designed to assist the migrant in finding alternative employment, "which does not prejudice national workers", if the employment for which he was recruited has been found to be inadequate (article 10). In the event of the migrant being also a refugee and becoming redundant, efforts must be made to find him alternative employment not prejudicial to national workers and to ensure his maintenance in the meantime (article 11).

96. It may be recalled that the Declaration on Social Progress and Development in article 19 (*c*) called on Governments to provide social welfare services for migrant workers and their families in conformity with the provisions of ILO Convention No. 97, and that the General Assembly in resolution 2920 (XXVII) of 15 November 1972 urged Governments which had not yet done so to give high priority to the ratification of this Convention in the context of their efforts to eliminate illicit trafficking in foreign labour. The same resolution invited the International Labour Organisation to strengthen the international machinery for the protection of migrant workers. [70]

Special measures concerning stateless persons and refugees

97. The Conventions relating to the Status of Stateless Persons and of Refugees contain provisions assimilating stateless persons and refugees to nationals in the enjoyment of certain rights (articles 4, 14, 16, 20, 22 (1), 23, 24 and 29 (1) of both Conventions) or according them the most favourable treatment granted to nationals of a foreign country (see articles 15 and 17 of the Refugee Convention), while other provisions accord refugees and stateless persons no less favourable treatment than that accorded to other aliens (articles 13, 18, 19, 21, 22 (2), 26 and 29 (2) of both Conventions and articles 15 and 17 (1) of the Convention on Stateless Persons). The Conventions also contain provisions to facilitate naturalization (articles 32 of the Convention on Stateless Persons and 34 of the Refugee Convention) and the travel (article 28 of both Conventions) of refugees and stateless persons.

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[67] The Treaty of Rome setting up the European Economic Community provides in article 36, paragraph 2, for the abolition of any discrimination based on nationality between workers of the Member States as concerns employment, remuneration and other working conditions. The appendix to the European Social Charter of 1961 declares that the provisions of the Charter extend to foreigners who are nationals of other Contracting Parties lawfully resident or working regularly within the territory of the Contracting Party concerned. Furthermore, articles 12 (4) and 13 (4) of the Charter impose concrete obligations on States Parties to extend to the nationals of the other Contracting Parties certain social security benefits, including medical assistance in case of want.

[68] See also article 2 of the ILO Convention on Freedom of Association and Protection of the Right to Organize and article 6 (*b*) of ILO Convention No. 97 concerning Migration for Employment.

[69] *Official Records of the General Assembly, Sixteenth Session, Annexes*, agenda item 35, document A/5000, paras. 119-124.

[70] On the rights of migrant workers see, *inter alia*, the following ILO resolutions and instruments: the Convention concerning Conditions of Employment of Plantation Workers, 1958; recommendation No. 86 concerning Migration for Employment (revised 1949); recommendation No. 100 concerning the Protection of Migrant Workers in Underdeveloped Countries and Territories, 1955; resolution V concerning action by the International Labour Organisation for Migrant Workers, 1967; resolution VIII concerning Trade Union Rights and their Relation to Civil Liberties, 1970 (in particular, operative paragraph 8 inviting "the Governing Body to extend and expand its efforts to eliminate the discriminatory practices on the basis of race, colour, sex, religion, nationality, political and trade union opinion which still exist in several countries, including countries and territories under a colonial régime or foreign domination in any form); resolution III concerning ILO Action for Promoting the Equality of Migrant Workers in All Social and Labour Matters, 1971; and resolution IV concerning Conditions and Equality of Treatment of Migrant Workers, 1972 (referred to also in General Assembly resolution 2920 (XXVII)).

Human rights provisions concerning internal migration and the movement of persons within the frontiers of a State

General principles

98. The right to freedom of movement and residence within the territory of a state is proclaimed in article 13 (1) of the Universal Declaration of Human Rights and in article 12 (1) of the International Covenant on Civil and Political Rights.

99. This right is recognized by the Declaration to "everyone" and is subject only to the general limitations laid down in article 29.

100. The right to liberty of movement and freedom to choose one's residence belongs, according to paragraph 1 of article 12 of the Covenant, to "everyone lawfully within the territory of a State", subject to the limitation clause in paragraph 3.[71] Among the restrictions consistent with the provisions of this paragraph can be mentioned the detention of a person in consequence of a lawful order of a court, the limitation on the freedom of movement of a person resulting from conditional release from detention, national service, any service exacted in cases of emergency or calamity or any work or service forming part of normal civil obligations (article 8 (3) (*c*) (i) (ii) (iii) and (iv) of the Covenant) as well as the lawful arrest and detention of a person under the conditions set down in article 9.

101. The right to freedom of movement and of residence can be derogated in times of public emergency under the provisions of article 4 of the Covenant subject to the conditions laid down therein.

Respective rights of nationals and aliens concerning freedom of movement in the territory of a State

102. The right to freedom of movement and of residence is recognized in the Universal Declaration to "everyone" without, according to article 2, "distinction of any kind".

103. The provisions of paragraph 1 of article 12 of the Covenant extend to "everyone lawfully within the territory of a State" and are subject to the general non-discrimination clause contained in article 2, paragraph 1, of the Covenant Thus, it would appear that restrictions on the freedom of movement of aliens would ordinarily be contrary to the Covenant. However, it would appear that a State has the right to limit the freedom of movement of aliens in times of public emergency, since the non-discrimination provision in article 4 is couched in more restrictive terms than article 2 and does not include nationality in the exhaustive enumeration of the grounds of discrimination prohibited under it.

104. Parties to the International Convention on the Elimination of All Forms of Racial Discrimination have the obligation under article 5 (*d*) (i) to guarantee the enjoyment of the right to freedom of movement and of residence within the border of the State to everybody without distinction as to race, colour or national or ethnic origin. This provision, however, has to be read in the context of the exemption clause in article 1 (2) to the effect that the Convention shall not apply to distinctions made by a State between citizens and non-citizens.

105 Article 26 of the Convention on the Status of Stateless Persons and of the Refugee Convention provide that stateless persons and refugees shall enjoy freedom of movement and of residence "subject to any regulations applicable to aliens generally in the same circumstances".

Prohibition of forced transfers of population within the territory of a State

106. Most of the provisions prohibiting forced transfers of persons beyond the frontiers of a State also prohibit forced transfers within its borders Thus, article 6 of the Nurnberg Charter, mentioned above, prohibits the deportation of civilian population, while the forcible transfer of children of one group to another group, punishable under article II (*e*) of the Genocide Convention, can take effect within the borders of a State.

107 Apart from the prohibition of the slave trade already referred to, certain institutions and practices akin to slavery are outlawed by article 1 of the Supplementary Convention on the Abolition of Slavery, the Slave Trade and Institutions and Practices Similar to Slavery, including the transfer of a woman by her husband, his family or clan to another person for value received, the institution or practice by which a woman is liable on her husband's death to be inherited by another person and the transfer or deliverance of children or young persons under 18 years of age by their parents or guardians to another person for the purpose of the exploitation of the child or of his labour The traffic of children "in any form" is prohibited by article 9 of the Declaration of the Rights of the Child

Measures to promote rural development and the planning of urban growth

108. The United Nations has of late increasingly turned its attention to the economic, social and environmental problems caused by the mass movements of persons from rural into urban areas.

109. Thus, the Declaration on Social Progress and Development recognizes the need for planned regional development, taking into account the diversity of needs between urban and rural areas (article 8 and 14 (*b*)), the importance of maintaining a proper balance between urban and rural development and of adopting measures to overcome the adverse social effects resulting from urban development and industrialization (article 17 (*a*)) as well as the requirement for comprehensive rural development schemes to raise the levels of living of the rural population and to facilitate urban-rural rela ' - ships and population distribution (a ' (*c*

[71] See paragraphs 58 and 59 above

110. The need to emphasize rural employment in developing countries and to remedy the ills of unplanned urbanization is emphasized also in the International Development Strategy for the Second United Nations Development Decade adopted by the General Assembly in resolution 2626 (XXV) of 24 October 1970 (paras. 66, 71 and 75).

111. The Declaration of the United Nations Conference on the Human Environment adopted in Stockholm on 16 June 1972 stated in principle 15: "Planning must be applied to human settlements and urbanization with a view to avoiding adverse effects on the environment and obtaining maximum social, economic and environmental benefits for all. In this respect profits which are designed for colonialist and racist domination must be abandoned." In principle 16, the Conference expressed its common conviction that "demographic policies, which are without prejudice to basic human rights and which are deemed appropriate by Governments concerned, should be applied in those regions where the rate of population growth or excessive population concentrations are likely to have adverse effects on the environment or development, or where low population density may prevent improvement of the human environment and impede development".

THE IMPACT OF FERTILITY ON HUMAN RIGHTS *

Francis X. Murphy **

1. In an era of mounting concern for the potentially disastrous consequences of an exponential increase in human numbers, the right of individual human beings to decide freely and responsibly the questions of procreation and family size as a personal prerogative must be thoroughly evaluated. Individual rights in all aspects of fertility have to be balanced against the needs of the larger community—family, State and ultimately the world. General resistance to family planning policies as a requirement of national development is rapidly disappearing Thus, the concern of this Symposium on Population and Human Rights should be centred on the implementation of rights that relate more directly to human reproduction and the effect that the regulation of fertility has on the exercise of freedom and responsibility.

2. In the pursuit of this objective, it is necessary to concentrate on those rights that can be considered in the context of current and projected population programmes. The motivation behind individual decisions in this respect depends greatly upon the cultural, legal, moral, political and economic factors affecting peoples' attitudes. Of equal relevance is the understanding and use of the methods of fertility regulation available. This paper concentrates on what can be termed "the humanitarian aspects of fertility control", in the effort to propose concrete measures for the implementation of the human rights and obligations whose pursuit is a principal objective of the Population Year 1974.

FERTILITY CONTROL

3 The development of principles by United Nations bodies concerned with the confrontation of fertility by the contemporary world has reached a stage in which it is conceded that there is a legitimate variety of goals in population policies. Some countries are satisfied with current levels of population; others are seeking increases; and still others are strenuously working to reduce fertility levels in the hope of achieving social and economic development While some States are concerned more with problems of sterility and subfecundity, the majority appear most anxious to control fertility levels and to persuade Governments and individuals, particularly in the developed areas, to cut back on over-use or wastage of natural resources and to reduce human reproduction in keeping with world needs.[1]

4. Several fundamental problems arise with the acceptance by the United Nations of the principle that individuals have the right to determine the number and spacing of their children freely and responsibly,[2] such as those concerning where this right is lodged, the way in which this right is to be realized, particularly in areas where the common good of a country or a people appears to be threatened by over-population, whether the Government has the right to establish fertility limits for individuals based upon the common good, and, if so, the way in which it implements such a policy in the face of contrary traditions and beliefs

5. The United Nations approach to the problem of fertility is based upon the Universal Declaration of Human Rights, which asserts that men and women of full age "have the right to marry and found a family"[3] This fundamental prerogative is clarified in a series of statements locating relevant human rights and responsibilities in the family, which, "as the basic unit of society and the natural environment for the growth and well-being of all its members, especially children and youth, should be assisted and protected".[4] This principle has been considerably modified by the gradual extension of its provisions to include the right of individuals to determine freely and responsibly the number and spacing of their offspring.[5]

6. The possible conflict between the exercise of freedom to procreate and the assumption of full

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[1] "Report of the Secretary-General on the draft world population plan of action" (E/CN 9/292), p 12

[2] General Assembly resolution 2211 (XXI) of 17 December 1966, *Final Act of the International Conference on Human Rights*, Teheran, April-May 1968 (United Nations publication, Sales No E 68.XIV.2), resolution XVIII, General Assembly resolution 2716 (XXIV) of 15 December 1970, sect. II C, para 4

[3] Universal Declaration of Human Rights, art 16; International Covenant on Civil and Political Rights, art. 23, Covenant on Economic, Social and Cultural Rights, art 10; General Assembly resolution 2018 (XX) of 1 November 1965

[4] Declaration on the Rights of the Child, principles 6 and 7: General Assembly resolution 1386 (XIV) of 20 November 1959

[5] Declaration on Social Progress and Development· General Assembly resolution 2542 (XXIV) of 11 Dec r 1969 arts. 4 and 22(*b*); General Assembly resolutio XI of 15 December 1970, sect II C, para 4

responsibility for the care and upbringing of offspring is to be settled in favour of the child. [6] The details of the latter's rights are given full attention in United Nations [6] instruments. They include the right of the child to be brought up in an "atmosphere of affection, and of moral and material security" based on the child's need for love and understanding. In turn, this requires that the child be given the possibility of growth and development in health, the enjoyment of adequate nutrition, housing, recreation and medical services in the care of its parents. [7] Provision is also made for an education on the basis of equal opportunity to develop its abilities and judgement, its sense of moral and social responsibility to become a useful member of society, protected from neglect, cruelty and exploitation. [8]

7. These provisions for the rights of the child indicate that parents should not have a child when they are not capable of giving it the essential care to which it is entitled. This reflection is crucial to the problem of population control, for it means that both in affluent societies and in deprived areas, no one should conceive and bring a child into the world without the possibility of giving it the essential love and care that will enable it to develop into a mature and responsible individual. It is within the context of these considerations that Government is justified in setting out population policies; and, in the attempt, to persuade people not to beget more children when their own or the country's economic and social conditions make it difficult or close to impossible to provide them with the factors necessary for the exercise of human dignity.

Marriage and parenthood

8. Considerable diversity exists in the concept of the family. This fact has to be taken into consideration in any attempt to clarify human rights in their relation to fertility. In many societies, *de facto* unions are far more numerous than formal marriages. A large proportion of the female population enters into more-or-less permanent consensual unions or casual "visiting" arrangements in which childbearing is accepted and begins early. [9] This phenomenon is prevalent in many parts of the developing world, and is not rare in vast urban slum areas. In more economically developed societies, single women are demanding the right to parenthood. Both the impermanence of casual marital arrangements and the independence of the unmarried mother challenge the obligation of responsibility in childbearing enunciated in the United Nations instruments clarifying the rights of the child. Thus, a symposium on population and human rights could properly suggest guidance for Governments faced with these phenomena as they affect national and international population policies. Provision for the amelioration of laws concerning illegitimacy; for the suppression of betrothal before the age of puberty, as well as of child marriages; and recommendations concerning polygamy are already contained in United Nations instruments and proposals. [10] Further reflection concerned with the development of the principle of freedom and responsibility in begetting offspring in relation to the rights of women and of men still appears to be a desideratum.

9. The principle of responsibility involves both parents in the obligation to provide factors essential to the child's well-being. In most societies, however, the impact of this obligation devolves more directly on the woman whose physical involvement in bearing the child, and in caring for its immediate wants and needs during infancy and childhood, is substantive. Although the man's desire for offspring and his affection for the child constitute a positive and powerful factor, his involvement is almost always contributory, rather than essential, to the immediate care and welfare of the new human being. [11] In the clarification of women's rights recognized in United Nations instruments, the equality of the wife with the husband is explicitly asserted. [12] This recognition contradicts ancient and traditional customs, whereby male domination prevailed in all decisions affecting the family, despite the substantive part played by the woman in childbearing and in her contribution to the domestic economy. But the exercise of this equality is still far from achieved. As its implementation is obviously connected with fertility control, it is an essential factor in the problems being confronted by this Symposium.

10. In most developing countries, the "large-family syndrome" still plays a crucial role in the population increase and has its roots both in a strong instinctual desire to beget a large progeny and in the fear of being abandoned in old age. In the past, this tendency was related to a high rate of infant mortality. While this latter danger has now been substantially reduced, there is the correlative fact that men and women living in deprived economic and social conditions find achievement in the begetting of a large family. Usually, this satisfaction is sanctioned by custom and religious belief.

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[6] General Assembly resolution 2263 (XXII) of 7 November 1967, Declaration on the Elimination of Discrimination against Women, art. 6, para. 2.

[7] *Final Act of the International Conference on Human Rights, loc. cit.*, p. 56.

[8] General Assembly resolution 1386 (XIV) of 20 November 1959, Declaration on the Rights of the Child, principles 9 and 10.

[9] United Nations Secretariat, Centre for Social Development and Humanitarian Affairs, "Women's rights and fertility", *Population Debate,* vol. II, part seven, para. 40.

[10] Universal Declaration of Human Rights, art. 16; International Covenant on Economic, Social and Cultural Rights, art. 10; Declaration on the Elimination of Discrimination Against Women, art. 6; and Convention and Recommendations on Consent to Marriage, Minimum Age for Marriage and Registration of Marriages. See also United Nations, Centre for Social Development and Humanitarian Affairs, *loc. cit.*, para. 34.

[11] United Nations, Centre for Social Development and Humanitarian Affairs, *loc. cit.*, paras. 48-50.

[12] Universal Declaration of Human Rights, art. 16; Declaration on Social Progress and Development, art. II (*b*) and (*f*); Economic and Social Council resolution 1326 (XLIV); see also "Youth and human rights; note by the Secretary-General" (E/CN.6/543).

The conflict of rights and obligations involved in this situation is the most widespread and difficult of all the problems faced in fertility-control policies.

Fertility control programmes

11. What now appears evident is that legislation and propaganda efforts by Governments or voluntary agencies do not change ingrained custom, particularly where it is buttressed by ancient tradition, religious beliefs, and clan, tribal or national aspirations. Planned parenthood programmes, while listened to politely and understood in their basic applicability, are simply ignored by people who feel that their privacy is being invaded. In the Buddhist, Hindu and Muslim cultures, as well as in the more fundamentalist Christian churches, there is still a general preference for large families and a strong suspicion that efforts to control conception are an invasion of family prerogatives designed to deprive the man of his virility and the woman of her fecundity.[13]

12. Similarly, in developing societies more generally, sexual behaviour is not considered a matter for discussion; and early marriage is encouraged as part of an ethic that looks to male and female fulfilment in offspring. Here, the experience of recent decades indicates that only a most sensitive approach to the cultural values motivating people's family structures and reproductive *mores* has any chance of success.[14] Where resistance to birth-control practices exists, it cannot always be categorized on an *a priori* basis. The assumption that a failure to accept family planning denotes the absence of rational behaviour is frequently not valid. The gains in economic and social well-being associated with a smaller family by birth-control proponents may not appeal to individuals or groups who feel that the advantages of a large family outweigh all such considerations. And it is possible that within the context of a particular region or country, large families are, in fact, advantageous.[15]

"Conscientization"

13. In pursuit of the human rights aspect of fertility control, little certain knowledge exists concerning the socio-cultural factors that affect peoples' attitudes towards the planning or control of births.[16] Nevertheless, the contention of sociologists that only when a threshold of modest affluence is reached does a society's birth rate go down, can be accepted as a given fact, even though there is no consensus on the specific reasons for this phenomenon.[17] An effective fertility-control programme must make every effort to co-ordinate educative efforts with immediate steps towards social and economic uplift at the lowest levels. This process can be called "conscientization". It signifies a method of making people politically conscious through the very means with which they are taught the elements of self-expression, hygienic and nutritional values and self-help in ameliorating local living and working conditions.

14. In the encouragement of this type of human uplift, the Population Year 1974 can offer a concrete hope towards the solution of present population problems. Governments should be encouraged to enlist the aid of agencies of the United Nations and other organizations geared towards research and pragmatic programmes in this endeavour. But they should also take into account the services of voluntary agencies and institutions that reach the people on a local level and that can assist in the gradual shift of their values through both educational and practical services, and through discovery of leadership qualities among local people which can be encouraged and adapted in accord with a reasonable fertility ethos. Here, women's organizations and religious and cultural institutions can play a decisive part, without involving Governments in the direct support of any of these associations.[18]

15. In accord with United Nations instruments, the rights of women to full equality in all spheres of human interests are being gradually acknowledged. Likewise, in almost all national constitutions there is a guarantee of freedom of belief and of religious or cultural affiliation. As these associations have the betterment of people's lives as a principal goal, their involvement in the programme for an effective approach to a just social and economic order should be encouraged.

16. During the past three decades, many of these religious and cultural associations have held local and international conferences devoted to development programmes. They have called upon Governments to direct full attention to the solution of the economic and political problems hampering the uplift of the poor and under-privileged. Thus, they have indicated not merely an interest but an obligation on their part to get involved; and many such associations are actually working on the ground level through inner-city movements, mission activities, and educational, nutritional and medical programmes throughout the developing world.[19]

17. In the discussion of the programmes for action for the Population Year 1974, a specific challenge should be directed to these cultural and religious organizations to have them become thoroughly involved in providing motivation and in clarifying values for the

[13] See Willard A. Hanna, *Population Review, 1970 Indonesia*, Fieldstaff reports, Southeast Asia series, vol. XIX (1971), pp. 15-16.

[14] *Measures, Policies and Programmes Affecting Fertility, with Particular Reference to National Family Planning Programmes* (United Nations publication, Sales No. 61.XIII.3), pp. 133-135.

[15] *Ibid.*, p. 135.

[16] *Ibid.*, p. 134.

[17] See Philip M. Hauser, "Population criteria in foreign aid programs", in J. Philip Wogaman, ed., *The Population Crisis and Moral Responsibility* (Washington, D.C., Public Affairs Press, 1973), pp. 233-251.

[18] See *Measures, Policies and Programmes A ecting F tility, loc. cit.*, pp. 73-78.

[19] See Richard M. Fagley, *The Popul ion Christian Responsibility* (New York, O 1960); Joseph Gremillion, *The Other* Doubleday, 1965).

solution of the problems related to fertility control on the level where it originates and where they can be most effective. In view of the clear and evident danger presented by the current world crisis, not merely of a dangerous population surplus, but of the depletion of world resources, the question may be asked if these ethically committed organizations can prove effective; if they can bring home to their members the need for change in attitudes towards the use of life resources, as well as in their reproductive habits.

18. What is generally agreed now is that in the literature on family planning there is full acknowledgement of the need to take socio-cultural factors into account in formulating family planning programmes. But most studies on knowledge, attitudes and practices have not produced hard, factual information with reference to the reasons that populations do not approve of, or practise, family planning.[20] In the challenge placed before them, cultural and religious organizations should be asked for assistance in gathering this information and for aid in utilizing it to offset traditions and taboos whose continuation constitutes a detriment to the solution of the population surplus.[21]

19. In most developing areas, one of the greatest difficulties encountered is in trying to persuade the individual—and keeping him or her persuaded—that systematic family planning is worth all the trouble. The motivation needed to achieve this persuasion cannot be supplied merely by setting up clinics and offering inducements, monetary or otherwise. It necessitates a massive and sustained campaign of education, information and personal persuasive efforts through local leadership and example. It is here that the cultural and religious organizations can be most effective.

Information and education

20. The dissemination of information concerning family planning through mass media, from television and transistor radio to the newspaper and school texts, involves several problems. While there is little objection to the spread of information concerning both the need for family planning as in keeping with human dignity and the right to determine the number and spacing of children, the projection of specific technical information can and does run into opposition. These are those people who consider such matters to be of a delicate moral texture not to be made the subject of public or general discussion. Of greater importance, perhaps, is protection of the audience from misconceptions or false appreciation of the physiological aspect of the complicated matters being discussed in fertility control. Also of considerable importance is the protection of children from exposure to information that they are not mature enough to appreciate.

21. The curiosity quotient of children is usually much higher than their parents realize; thus, there is great probability that children are discussing sexual aspects of family planning long before their elders are aware of the fact. This matter, it would seem, is an area for consideration by a symposium such as the present one, in an attempt to balance the right of parents to control the type of education they desire for their children against the children's need to know, in keeping with the interests of their developing minds and bodies, and the information being discussed by their peers.

22. A further extension of this problem is the inclusion of sex education and attitudes towards family planning in school curricula, and the consequent possible conflict of rights between the prerogatives of parents and the policies of the State as the guardian of the social well-being of society. Lastly, the question of making available to minors sex education and information about contraceptive methods, without the knowledge of their parents, has become a delicate issue in the field of human rights. The question may be asked whether such a programme would be looked upon by parents as a threat to the moral guidance they must exercise for the spiritual and psychological well-being of their offspring and whether the programme might possibly offend against the clause of the United Nations resolution calling for protection of children and minors from corruption.[22]

23. The right to exercise freedom and responsibility in spacing and determining the number of offspring includes the necessary information and education to be able to pursue this prerogative. It rules out coercion of any type on the part of Government, particularly the attempt to mislead people having large families into submitting to sterilization or abortion procedures without their understanding the meaning of such interventions. Persuasive means involving educative advertising, direct monetary or tax or other material or cultural advantages are legitimate provided they are properly understood by the populace and are not directly discriminatory against the poor or particular sectors of society.

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[20] See *Measures, Policies and Programmes Affecting Fertility, loc. cit.*, pp. 11-15 and foot-note 11.

[21] A change of attitude in the Catholic Church is crucial in this respect. In 1965, Vatican Council II acknowledged the right of parents to "decide the number of children they should have" (Pastoral Constitution, *Gaudium et Spes*, paras. 50 and 87). The Encyclical, *Populorum progressio* (1967), acknowledged the need for population control (para. 37). Although the Encyclical, *Humanae vitae* (1968), confused the issue by condemning the use of artificial contraceptives, that document stressed the obligation of responsible parenthood and population control (para. 10). See A. McCormack, *The Population Problem* (New York, 1970). Most other Christian churches favour both responsible parenthood and population control. While the oriental religious groups are, for the most part, indifferent to methods, they incline towards reserve in discussion of such matters and generally favour large families.

[22] See Universal Declaration of Human Rights, art. 26; International Covenant on Civil and Political Rights, art. 18, para. 4; Declaration on the Rights of the Child, principle 7; General Assembly resolution 1386 (XIV) of 20 November 1959. No attempt has been made to reconcile the difficulties between the right of parents over against the right of the State to determine the basic information needed for sex education and family planning. See *Official Records of the General Assembly, Twenty-fourth Session, Third Committee*, 1682nd meeting, pp. 173-175.

In United Nations instruments, such discrimination has been made the equivalent of a type of genocide.[23]

24. While the right to know all that is actually understood about fertility control and the means for its actualization is proper to all human beings, and particularly to those of mature age, the deficiencies of the educational process in most societies, and particularly in deprived areas, along with the reluctance of men, more generally, to allow themselves to be approached about such matters, indicate that the most effective procedures are those which attempt to instruct the younger generation of mothers, and through them, the older women.[24]

25. One achievement of Population Year 1974 should be the encouragement of women's rights movements, both in the economically advanced societies and in the developing areas, to undertake a vigorous effort to further the "conscientization" of women with respect to their basic dignity and the power they should wield in the decision-making processes of the economic, social and political order.[25] This does not mean that effort should not be made to enlist the man of the family, particularly in rural and backward areas, who shares an equal burden in achieving its well-being In practical life, it is usually much easier to effect family and cultural changes such as these through word-of-mouth exchanges among women rather than among men.

26 In the final analysis, the vindication of women's rights should inspire the emancipated woman to a new and vigorous approach to the solution of the world's demographic problems by turning full attention to the essential role that can be played by women, especially in peasant and emerging societies This will best be achieved by a consistent effort at extending family-support services throughout deprived areas, beginning with hygienic and nutritional education and advancing to a full round of health concerns whose final goal will be the demonstration that fertility control and small family units are the pathway to development What is essential is that the rights to responsible parenthood be recognized at the ground level, and that the obligations involved in fertility-control programmes be seen as a function of the whole society, rather than as the result of imposition by Government from above

[23] Convention on the Prevention and Punishment of the Crime of Genocide, art. 2, para (*d*). See "Report of the [illegible] Resolu- [illegible] s" (E/ [illegible] ng, Jr, [illegible] on", in [illegible] "Popu- [illegible] ulation [illegible] ations, [illegible] Foreign [illegible] Johns Hopkins Press, [illegible])

[24] See *Measures, Policies and Programmes Affecting Fertility, loc cit*, pp 142-143.

[25] In a speech on "Population, nutrition and the role of women", delivered at the Conference on World Food and Population Problems (New York, 4 April 1973), Richard M Fagley insisted that not only do village women play the basic role in the domestic economy, particularly with respect to nutrition, but they are the key to the physical and mental health of the pre-school child, the human capital of the future Although she is outside the market economy, her contribution of food and clothing is crucial to family survival

WOMEN'S RIGHTS AND FERTILITY *

United Nations Secretariat **

WOMEN'S RIGHTS FROM A DEMOGRAPHIC AND HUMAN RIGHTS PERSPECTIVE

1. The United Nations in its Charter and in the Universal Declaration of Human Rights proclaimed its faith in the dignity and worth of the human person and in the equal rights of men and women. All Member States have pledged themselves towards this end. More recent declarations and numerous resolutions have called for equality between men and women in all areas of law, political life, education, employment, and marriage and the family (E/CN.6/552). Moving beyond the concept of legal status alone, the Declaration on the Elimination of Discrimination Against Women, for example, demanded the eradication of prejudice against women and the abolition of all customs, regulations and practices in daily life that are based on the idea of the inferiority of women or that serve to discriminate against them (General Assembly resolution 2263 (XXII), articles 2 and 3).

2. These comprehensive goals are relevant not only to the expansion and protection of basic human rights, but to the analysis of the association between various aspects of the status of women and demographic patterns of fertility, mortality and migration. Fertility, and the social processes associated with it, are of special importance in this regard. The status of women may be seen as both a determinant and a consequence of variations in reproductive behaviour. A woman's health, educational opportunities, employment, political rights and role in marriage and the family all affect, and in turn are affected by, the timing and number of her children and by her knowledge of how to plan them. The impact of birth planning on the individual woman's potential for personal autonomy and for participation in all sectors of society—that is, the human rights aspect of the relationship—is clearly as important as the question of the impact on fertility of improvements in her status, which may be of greater interest from the demographic point of view.

3. In this paper, the status of women in public and private life is measured primarily by the number of years of their schooling, by their representation in the paid labour force as shown in censuses and surveys, by their integration in major areas of political decision-making, and by their age at marriage and rights and obligations within the family, in so far as these can be determined. These indicators are imperfect, however, especially in the area of employment where labour force statistics often exclude large numbers of female agricultural labourers or other unpaid workers who nevertheless participate actively in the process of production or provide essential services upon which production depends.

THE RIGHT TO DETERMINE FREELY AND RESPONSIBLY THE NUMBER AND SPACING OF ONE'S CHILDREN

4. In 1966, the United Nations proclaimed for the first time that "the size of the family should be the free choice of each individual family" (General Assembly resolution 2211 (XXI)). The International Conference on Human Rights, in 1968, declared more broadly that couples have a basic human right to decide freely and responsibly on the number and spacing of their children and a right to adequate education and information in this respect. [1] By 1969, the concept had evolved to include the right to knowledge and the means to space and limit births (General Assembly resolution 2542 (XXIV), article 22), and it will continue to evolve as individual and family rights in this area are further elaborated.

5. A number of legal, economic, social and cultural factors, however, constrain women from fully exercising the right to plan births. Such constraints include, for example, legislative restrictions on access to relevant education, information, advice and services; [2] inadequate family planning programmes that leave many women—especially poor and rural women—without knowledge of the possibility or the means to regulate fertility safely

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** Department of Economic and Social Affairs, Centre for Social Development and Humanitarian Affairs.

[1] "Human rights aspects of family planning", resolution XVIII, *Final Act of the International Conference on Human Rights* (United Nations pubilication, Sales No. E.68.XIV.2), p. 14.

[2] *Measures, Policies and Programmes Affecting Fertility, with Particular Reference to National Family Planning Programmes* (United Nations publication, Sales No. E.72.XIII.2), pp. 39-49; World Health Organization, "Abortion law: a survey of current world legislation", in *International Digest of Health Legislation*, vol. 21, No. 3 (1970), pp. 437-512; and Luke T. Lee and Arthur Larson, eds., *Population and the Law* (Durham, N.C., Rule of Law Press, 1971).

and effectively; [3] cultural definitions of woman's primary role as sexual partner, homemaker and breeder of children rather than as full participant in the social and economic life of her community; lack of alternative roles for women outside the home, and patterns of male dominance within the family, including hostility to the use of female contraceptive methods and to the independent rights of the woman, among others

6. What is the impact on the individual woman of her ability to plan births? Certainly the knowledge alone of the possibility and means of doing so gives women the power to shape their lives in ways undreamed of by those who have never questioned the inevitability of their childbearing or who have resorted in desperation to cumbersome, ineffective and often dangerous methods to stop unwanted births Birth planning in this respect is an essential ingredient of health [4] and human dignity. And when the power to space and limit pregnancies is translated into an actual decision to do so, the impact on women's status may be dramatic. Disaggregated into its components of the ability to delay the first birth, to space births several years apart, to stop childbearing earlier in the life cycle and to limit the total number of births (or to have no children), each aspect of birth planning may be examined separately for its effect on the woman's health, on the health of her children, and on the exercise of her economic, social and political rights in the society and in the family.

The right to an education

7 According to the Universal Declaration of Human Rights (General Assembly resolution 217 A (III), article 26), everyone has the right to an education. In the Declaration on the Elimination of Discrimination Against Women (General Assembly resolution 2263 (XXII), article 9), among other documents, girls and women, married or unmarried, are to be assured equal rights with men in education at all levels, including study in educational institutions of all types, the same choice of curricula, and equal access to scholarships and other financial support. [5]

8 Equal education has proved to be an elusive goal, however, even in countries where equality under the law is guaranteed Illiteracy rates in most countries are much higher among women than among men, although the situation is improving. [6] Females are less than half of the school population in most countries and their proportions decline rapidly at the highest levels of training. [7] Within educational institutions, certain fields of study are often strongly sex-typed as appropriate for females only or males only, although the degree of sex-typing varies considerably between countries. In many areas, the relative under-representation of girls and women in schools is compounded by an over-all scarcity of educational resources, placing them at an even greater competitive disadvantage. [8] The scarcity is often greatest where population pressures are most acute

9 One may ask what effect the ability to determine the number and spacing of one's children has on the exercise of woman's right to an education and to equal treatment in the schools at all levels.

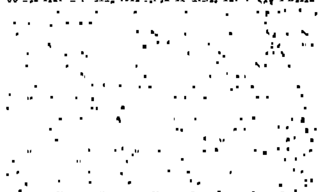
10. Delaying the onset of childbearing, either through delaying entry into marriage or *de facto* unions or by postponing the first birth within marriage, is the most relevant aspect of fertility regulation in this regard Postponing the first birth should have the greatest impact on a woman's opportunities for vocational training or for secondary, college or university education in those countries or among socio-economic groups in which she had a high probability of pursuing an education beyond the normal first years of childbearing to begin with, [9] and in which the birth of a child would effectively limit her chances of staying in school. [10] Where few girls receive higher education,

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[3] International Planned Parenthood Federation, *Family Planning in Five Continents* (London, 1972); Dorothy Nortman, "Population and family planning: a factbook", in *Reports on Population/Family Planning*, No 2, 4th ed (New York, The Population Council, 1972)

[4] World Health Organization, *Health Aspects of Family Planning*, Technical Report Series No. 442 (Geneva, 1970); International Planned Parenthood Federation, "The relationship between family size and maternal and child health", Working Paper No 5, London, July 1970, Abdel R Omran,

for which information was available, 58 per cent in Asia, 94 per cent in the Americas, 97 per cent in Oceania, and



ever, far less disadvantaged than those in most countries of Asia and Africa with similar rates of school enrolment for males.

[9] An average of approximately 20 per cent of women aged 15-19 were enrolled in school in countries of Africa reporting such information, 28 per cent in Asia, 29 per cent in the Americas and 32 per cent in Europe; but there were wide differences between countries and among socio-economic groups See foot note 11 for sources

[10] In the United States of America, data from a national sample taken in 1965 of 1,600 high-school sessions, who were

and 27 per cent of single men A J. Jaffe and Walter Adams, Bureau of Applied Social Research, New York, unpubl data

delaying the first birth is likely to make little if any difference as to her educational opportunities although it may well have a significant effect on other aspects of her life.

11. In societies where women marry and bear children early and in which virtually all women marry, the obstacles to the woman's exercise of her right to an education may not be her lack of knowledge or means to plan and space children so much as the social, economic and cultural pressures that steer her into an early marriage in the first place. Parental control over the decision as to which of their children will attend school, the timing of their children's marriages and the choice of spouse may preclude a young woman from making an individual decision attaching a higher priority to education than to early motherhood. [11] On the other hand, the ability to delay marriage or a first birth does become salient as higher education for women becomes more generally accepted and valued.

12. Spacing pregnancies, limiting the number of births and ending childbirth earlier in the life cycle should also act independently to free women for formal schooling of various types, although the impact of these fertility variables on education is probably far weaker than the impact of postponing the onset of motherhood. [12] They may affect women's attendance at adult literacy classes, however. [13] In the long run, one would expect that as women increasingly delay, space and limit their birth, spending shorter and shorter periods of their lives in childbearing, their claim to equality in education will become all the more persistent. But education itself may be the very pre-condition necessary for motivated birth planning.

13. Is it possible to untangle the network of interacting variables into cause and effect? On one side, as has been indicated, early marriage itself or in combination with childbearing can "prevent" education by forcing or inducing women to discontinue their studies. Thus, where other structural and cultural conditions favour higher education for women, the effective postponement of marriage and/or births is often crucial to the exercise of their rights in this area. On the other side, education can "prevent" marriage and childbearing or postpone it beyond the average age of family formation as long as the woman stays in school. [14] From a demographic point of view, the effect of education on reproductive behaviour is the more interesting aspect of the association. Indeed, the educational level of women appears to be one of the strongest factors affecting fertility, especially in high-fertility countries.

14. It may be, as some writers have suggested, that the number of years of formal schooling is simply the most visible and quantifiable element in a cluster of interdependent forces affecting fertility, and that it is not higher education *per se* but its association with such factors as openness to new ideas, higher levels of living, exposure to an urban environment and a greater range of options and interests outside the home that is responsible for the apparent influence of one on the other. Nevertheless, most studies show that the educational level of the wife is more strongly correlated with a couple's fertility than the educational level of the husband, suggesting that regardless of the way in which the causal mechanism works, investment in female education may have a greater impact on fertility than the same investment in schooling for men.

15. The relationship is not a simple one, however, nor is it inverse in all cases. The number of years of schooling a woman has received is, after all, only one factor among many influencing her reproductive behaviour; other biological, economic, social and cultural variables affecting fecundity, family size preferences and access to birth control may render it more or less functional. The question is in what way, and under what conditions, does a woman's education make a difference.

16. Higher education for women can work indirectly to reduce fertility in at least three ways, through: (*a*) delaying marriage and increasing the probability of non-marriage, thus reducing or eliminating the time span of exposure to the possibility of conception; [15] (*b*) reducing desired family size, by creating aspirations for a higher level of living for the couple and their children and by stimulating women's interest and involvement in activities outside the home, especially employment; and (*c*) exposing women to knowledge, attitudes and practices favourable to birth control, including a higher level of communication between husband and wife, enabling them to bring their actual reproduction in line with their desired family size.

17. In most developing countries, the education of women appears to have a very strong impact on family size; but where higher education is confined to a small *élite*, its impact on over-all birth rates is slight. [16] How-

[11] A high degree of parental control does not, however, necessarily lead to very early marriages; it is also compatible with marital postponement. See Judith Blake, "Parental control, delayed marriage, and population policy", in *Proceedings of the World Population Conference*, vol. II, *Fertility, Family Planning, Mortality* (United Nations publication, Sales No. 66.XIII.6), pp. 132-136.

[12] For an interesting discussion of the disruptiveness of the first birth as compared with additional births and the consequences of its timing to women's roles, see Harriet B. Presser, "The timing of the first birth: female roles and black fertility", *Milbank Memorial Fund Quarterly*, vol. 49, No. 3 (July 1971), pp. 329-362.

[13] Heavy domestic obligations were cited as major obstacles to enrolment of women in literacy classes in United Nations Educational, Scientific and Cultural Organization, "Equality of access of women to literacy", ED/MD/14, 31 August 1970.

[14] See H. V. Muhsam, "Education and demography", in International Union for the Scientific Study of Population (hereafter referred to as IUSSP), *International Population Conference, London, 1969* (Liège, 1971), vol. III, pp. 1867-1874.

[15] Assuming either a low probability of sexual contact outside of marriage and/or a high degree of birth control.

[16] For example, in a national sample survey of 3,200 currently married Turkish women under 45 years of age, conducted by the Hacettepe Institute of Population Studies in 1968, university graduates averaged 1.4 live-born children as compared to 2.0 for secondary-school graduates (12 years), 2.1 for elementary-school graduates (8 years), 2.8 for women with at least 5 years of primary school, 3.2 for women with

(Continued on next page)

ever, even the transition from illiteracy to literacy resulting from very low levels of schooling is shown to have some influence on family size in many areas, unlike

show that women with secondary-school and higher education marry considerably later, are less likely to marry at all, desire smaller families and are far more likely to know about and practise "modern" effective contraception than are less educated or illiterate women. [18] Yet, the majority of women of reproductive age in a number of developing countries, and especially in rural areas, are illiterate and without effective options in this area. Indeed, cultural pressures towards high fertility in rural areas may be so strong as to obliterate the effect of six or eight years of schooling on reproduction entirely. [19]

18. Moreover, just as a high level of education may not motivate a woman to want a smaller family if her training does not lead to active participation in employment outside the home, female employment itself may not influence fertility significantly unless a woman's education has prepared her for something more than subsistence agricultural labour, unpaid work in a family enterprise, or other low-status, low-paying jobs. It is essential that special efforts be made in total development planning to ensure that women receive the kind of academic and vocational education that will prepare them to assume a full and equal role with men in all aspects of economic production, but especially in the modern sectors of agriculture, industry and services

Rights pertaining to employment

19. International instruments declare that everyone has the right to work, to free choice of employment, to just and favourable conditions of work, to protection against unemployment, to fair remuneration and to equal pay for equal work, among other rights. Women, married or unmarried, are to have equal rights with men in this regard. In addition, in order to eliminate other forms of discrimination against women in employment, measures are to be taken to prevent their dismissal in the event of marriage or maternity, to provide paid maternity leave with the guarantee of returning to former employment, and to provide child care facilities and other necessary social services [20]

20 In most countries, women are far from achieving equality in employment with men. General conditions of unemployment, underemployment and low wages, where they occur, adversely affect both men and women, of course. But women often find it particularly difficult to exercise their right to equal work and equal pay.

21. Conditions vary greatly from country to country according to culture, socio-economic structure and the level of development. In general, however, one finds that women are less likely to be gainfully employed outside the home than are men, although they may be engaged in equally heavy and unpaid domestic or agricultural labour. [21] They are also more frequently classified as unemployed and looking for work than are men in many countries. Female earnings often average only a fraction of male earnings even when other factors, such as type of work, education, training and experience, are taken into account Almost everywhere one finds women in the paid labour force disproportionately concentrated in lower status, lower paying jobs Most employers do not provide paid maternity leaves or guaranteed return to former employment after childbirth, as the Declaration on the Elimination of Discrimination proposes, and child-care facilities in most countries are inadequate to meet the needs of working parents.

22. Moreover, whereas rates of male gainful employment vary little from country to country, or through the normal working years in the life cycle, rates of female employment differ enormously between countries and within major subgroups of the population, usually follow well-defined patterns by age and

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fewer than 5 years and 4 2 for illiterates However, university graduates were only 0 5 per cent of the sample, while two thirds were illiterate. Serim Temur, "Socio-economic determinants of differential fertility in Turkey", *The 2nd European Population Conference, Official Documents of the Conference*, Strasbourg, 1971 (London, Council of Europe, 1971), vol III, pp 131-139.

[17] Halvor Gille, "Summary review of fertility differentials in developed countries", in IUSSP, *International Population Conference, London, 1969* (Liège, 1971), vol III, pp 2011-2025 *The Second European Population Conference, Official Documents of the Conference*, Strasbourg, 1971 (London, Council of Europe, 1971), vol. III, pp. 131-139

[18] See references in IUSSP, *International Population Conference, London, 1969, World Population Conference, 1965*, vols I-IV (United Nations publications, Sales Nos 66 XIII.5, 6, 7 and 8); *Proceedings of the Eighth International Conference of the International Planned Parenthood Federation, Santiago, Chile, 9-15 April 1967* (London, 1967), and KAP studies, among others

[19] For example, J. M. St... and R. H. W... [illegible]

Stycos suggested that a certain amount of urbanization may be necessary to "activate the effect of education on fertility", J. M. Stycos, *Human Fertility in Latin America* (Ithaca, N Y, Cornell University Press, 1968), p 269

[illegible]

International Labour Organisation, [illegible] *Lab[illegible]tistics*, 1972, table 1; 1971, table 1.

generally fluctuate according to marital status and the number and spacing of children.[22]

23. In this section is a discussion of the relationship between variations in female employment and fertility. The major problem in analysing such a relationship derives from the difficulty of distinguishing cause and effect, as was the case for education. Does the opportunity or need to work actually influence women to have fewer children, or is it more often the case that women who have fewer children for a variety of reasons are free to take outside employment? The relative weight given to one factor over the other depends upon unique situations in every country, but it is possible to make a few generalizations.

24. A consideration is the impact of birth planning on female employment. Where cultural and structural conditions are conducive to female employment and where worker-mother roles are incompatible, one can point to the considerable advantages that women practising effective birth planning have over those who accept early and frequent childbearing as inevitable. Delaying marriage[23] and the first birth may enable women to complete their education and vocational training so that they are qualified for more highly skilled jobs or to establish themselves in a profession, if such options are otherwise open to them. Controlling the timing of births permits women to combine employment and childbearing in the least disruptive way. Keeping family size small frees women to work who might otherwise be overwhelmed by domestic responsibilities, especially in those countries where child-care assistance is scarce.[24] Lastly, having the last child early in the life cycle eases the burden on women working away from home and may encourage those who have stayed at home to re-enter the labour force.[25] Viewed in this light, the exercise of the right to determine the number and spacing of children can have a direct impact on the woman's exercise of her economic rights. On the other hand, where opportunities for women in employment are few, or where women are discriminated against on the assumption that they are (or will be) married and have children and that they have less right to a job or an income than a man, an individual woman may not be able to improve her chances in the labour market at all by delaying, spacing or limiting her births.

25. The other side of the coin is this: to what extent might the full exercise of women's rights to equality with men in employment influence the number and spacing of their children? If a consistent causal effect were to be found, the implications for development strategies would be clear: ensuring women's right to equal work and equal pay should serve the purpose of reducing birth rates while simultaneously facilitating economic and social development. However, the relationship depends not upon the simple fact of gainful employment, but upon the sector of the economy in which the woman is employed, her occupation, income, work commitment, duration or continuity of employment, whether it is full or part-time; and on the availability of child care, among other factors.

26. Most research has focused on the concept of role incompatibility in attempting to explain variations in the strength of the association between female employment and fertility. The more mutually exclusive are the roles of worker and mother, the more likely it is that gainfully employed women will remain childless or have smaller families than non-employed women. Female employment should reduce fertility most effectively when birth planning is widely practised and when the roles of worker and mother are most incompatible, that is, when: (*a*) the place of work is away from the home, which may pose practical problems relating to child care; (*b*) the prevailing belief is that women should devote full time to their children, in which case the woman feels she must choose between work and children; and (*c*) the woman's employment provides her with significant social, psychological or economic rewards which she may be unwilling to forgo in order to have another child.

27. It is mainly in the industrialized countries that the relationship between female employment and fertility appears to be most clear when currently employed and non-employed women are compared, although historical studies have shown that major declines in the birth rate have often preceded the expansion of women's labour force participation. Women who are employed full-time tend to have smaller families (or to remain childless) more often than those who are employed part-time or not at all.[26] Those who have worked for a

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[22] See, for example, Nicole Dubrulle, "Communication sur l'emploi féminin en Europe", in *The Second European Population Conference, Strasbourg, 1966, Official Documents of the Conference*, vol. II, C 48; Tomas Frejka, "Demographic Aspects of women's employment", in IUSSP, *International Population Conference, London, 1969*, vol. III, pp. 1559-1571; and other articles in the same volume.

[23] Marriage itself, apart from childbearing, can reduce women's participation in the labour force to a large extent; see N. Dubrulle, *loc. cit.* In the province of Santiago, Chile, for example, although the participation rates of married women without children between the ages of 20 and 50 in 1960 (26.3 per cent) were considerably higher than those for married women with children, they were far lower than those for single women without children (68.8 per cent). See Juan Carlos Elizaga, "Demographic aspects of women's labour force in Latin America and Chile", in IUSSP, *International Population Conference, London, 1969*, vol. III, p. 1594.

[24] However, the effect of number of children on labour force participation often drops off after the third or fourth child; beyond that number further increases in family size may not significantly reduce the rates of mother's employment. See foot-note 23; J. C. Elizaga, *loc. cit.*, p. 1596; Jerzy Berent, "Some demographic aspects of female employment in Eastern Europe", in IUSSP, *International Population Conference, London, 1969*, vol. III, pp. 1580-1584.

[25] Stuart Garfinkle found in the United States of America that, for most women, the major proportion of work life occurs after a woman has raised her family and re-entered the labour force. A woman marrying at 20 years of age with one child had in 1960 a work life expectancy essentially of the same length (25 years) as a 35-year-old working woman who has completed her family. Stuart Garfinkle, "Work in the lives of women", in IUSSP, *International Population Conference, London, 1969*, vol. III, p. 1603.

[26] H. Gille, *loc. cit.*; "Family planning and social policy in Europe" (SOA/ESDP/1971/2), p. 14.

major part of their married lives have smaller families than those who worked for only short periods or sporadically.[27] Women in white-collar and professional occupations—occupations which require higher education and provide greater social and economic rewards—have smaller families than women in blue-collar and service occupations.[28] Women with a high degree of work commitment (for example, women who say they would continue to work even if their husbands made all the money they needed) are more likely to know about and practice modern and effective birth planning and to bear fewer children than those who work only from economic necessity.[29] In rural areas of industrialized countries, however, where agricultural labour is not so incompatible with raising a family, the relationship between female employment and fertility often disappears.[30]

28. In most developing countries, the employment-fertility relationship is less clear, although a distinction must be made between urban and rural areas and between the "modern" and "traditional" sectors of the society.

29. [illegible]

and in part because the employment is likely to be of an agricultural, marketing or cottage industry type in which a woman may either keep her young children with her while she works or leave them with other family members.[31] The same reasoning holds true for women who are engaged in unpaid production.

30. In urban areas, on the other hand, woman's paid employment is more likely to be incompatible with raising a family if it takes her out of the home and if she has difficulty in finding ways to care for her children She is also more likely to learn about birth control and have access to family planning services in urban than rural areas, although much depends upon the sector of the economy in which she works. For example, some studies in urban centres of developing countries have shown that women in the professions and in white-collar occupations are more favourably disposed towards the use of contraceptives and have fewer live births than skilled manual workers, who in turn have smaller families than women in sales, trade or the service sector.[32]

31. Generally speaking, however, the opportunities for labour force participation of women in non-agricultural sectors of the economies of developing countries have been extremely limited. As a number of writers have pointed out, the process of economic development is not a unilinear one leading inevitably to the greater integration of women in non-agricultural production.[33] The experience of many African countries and of India, for example, shows that rural-urban migrations accompanying development frequently deprive women of their formerly productive role in agriculture, handicrafts or marketing without offering a substitute role in the modern sector of the towns, where unemployment is usually high[34] Under these marginal conditions one would not expect urban birth rates to decline rapidly. When the development effort is heavily capital-intensive rather than labour-intensive, women may find it particularly difficult to compete with men for mechanized, "male-typed" jobs Some critics have suggested that an alternative form of development is preferable, one that is both labour-intensive,[35] and, in areas where disapproval of women working runs high, one that creates new fields of work for women that do not compete with male fields.[36] The work should be atttractive to women and take them out of their homes if it is to have an effect on reproductive decisions

Rights pertaining to marriage and the family

32. Perhaps no issue in the area of women's rights has been as sensitive or as controversial as the idea of equal rights of men and women "as to marriage, during marriage, and at its dissolution", although the principle is clearly stated in article 16 of the Universal Declaration of Human Rights. In many countries, equality within the family has not yet been recognized in civil law, and, upon marriage, women may be deprived of many civil rights, such as the independent ownership of property or the right to work without their husband's consent But even in countries where legislation favours equal rights, traditional cultural patterns of male dominance in private life are slow to change.

33 Could the widespread practice of birth planning significantly alter the status of women as compared to

[27] H Gille, *loc cit*; Stanley Kupinsky, "Non-familial activity [illegible]

[30] T Frejka, *loc. cit*, p 1567

[31] See Dubrovka Stampar, background paper A, Seminar on the Status of Women and Family Planning, Istanbul, 1972.

[32] Patrick Ohadike, "The possibility of fertility change in modern Africa· a West African case", in IUSSP, *International Population Conference, London, 1969*, vol I, p 809

[33] See, for example, *Demographic Aspects of Manpower, Sex and Age Patterns in Economic Activities* (United Nations publication, Sales No 61.XIII 4); Andrew Collver and Eleanor Langlois, "The female labour force in metropolitan areas. an international comparison", *Economic Development and Cultural Change*, vol 10 (July 1962), pp 363-385, Ester Boserup, *Woman's Role in Economic Development* (New York, St [illegible]

[illegible] tions Fund for Population Activities Seminar on Population Problems as Related to Food and Rural Development in the Near East, Cairo, December 1972 For additional proposals see "Integration of women in development" [illegible] 5/481)

men in private life? And how does a woman's educational or employment status affect her role in the family? Do laws and practices relating to the status of women at the time of marriage, during marriage and at its dissolution (through death, divorce, desertion, separation, annulment) influence reproductive behaviour in a way that can be isolated from the effects of other, related forces? The area is a rich and fascinating one to explore, for it is, of course, in the everyday interaction between the sexes that extraneous factors, such as education or employment, are translated into actual reproductive patterns through the medium of sexual expression and birth planning behaviour.

Rights on entering marriage

34. The United Nations has declared that child marriage and the betrothal of young girls before puberty is to be prohibited and that women shall have the same right as men to free choice of a spouse and to enter into marriage only with their free and full consent. The inheritance of widows is banned; minimum standards for age at marriage are to be set in every country at not less than 15 years, with all marriages being officially registered. [37]

35. Legal minimum ages for the first marriage of girls range from about 12 to 20 years, while actual averages range somewhat higher, from about 14 or 15 years to 24 or 25. [38] In setting a legal minimum age for marriage, most countries have legislated inequalities by setting a higher minimum for males than for females, although there is a trend towards greater equality in laws enacted in recent years. In general, the pattern in western industrialized countries over the past century has been one of delayed marriage and relatively high proportions of women remaining single throughout their childbearing years (from 5 to 20 per cent), while in developing countries, early and universal marriage for girls is more the rule. [39] However, there are important exceptions to this generalization, and, in recent years, the marriage patterns of many developing and industrialized countries appear to be converging towards an intermediate position.

36. Social pressures to marry girls off while they are very young remain strong in many regions, especially in Moslem countries, in India and in tribal African societies. An unmarried daughter past a certain age may be considered a disgrace to the family. Moreover, one generally finds that in countries where girls marry very early, the age gap between brides and grooms on entering marriage may average as high as 10 to 12 years. Thus, the girl's already subordinate position at the time of her marriage is compounded by the additional advantages her husband has accrued with his age and "experience". Where women marry later, the difference in ages is usually much smaller. And in most countries, the average age at first marriage for women is higher, and the age gap between brides and grooms smaller, among educated and employed women and among those living in cities or towns.

37. What impact would the ability to space and limit births have on the timing of marriage and the exercise of the woman's rights at this crucial transition period in the life cycle? Having discussed the effect of birth planning on education and employment in the previous sections, an attempt is made here to consider only the direct, independent effect of birth planning on the timing or probability of marriage.

38. The essential contribution of birth control is, of course, the separation of sexual behaviour from reproduction. In examining the effect of contraception on the *timing* or probability of marriage, then, much depends upon the cultural *mores* of the particular society. Where pre-marital heterosexual relations are common, the ability to delay the first birth could serve to raise the *average age at marriage and place women in a far better* bargaining position over the choice of a spouse or of whether or not to marry at all, especially where a high proportion of early first marriages appear to be "caused" by an unplanned pregnancy. [40] It could also increase her chances of an eventual marriage in societies where out-of-wedlock births are common and yet where a woman without children has a better chance of finding a legal husband than a woman who has had children by another man. [41] If the early pregnancy is intended as a means to ensure marriage, however, as in societies where a woman's fecundity must be proved before she is acceptable as a bride, then there would be little motivation for birth planning at this stage in the life cycle.

39. Effective birth planning can also lower the average age at first marriage by making it possible for couples to marry early while postponing their childbearing. Much of the decline in the average age of brides in western countries in the past three decades may be attributed to this factor. [42]

40. Turning the question around, how much impact on family planning behaviour and fertility would one expect the abolition of child marriage or betrothal to have, or the exercise of the right to free choice of spouse

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[37] See General Assembly resolution 217 A (III), article 16; resolution 2200 (XXI), annex, article 10; resolution 2263 (XXII), article 6; resolution 1763 (XVII), annex; and resolution 2018 (XX).

[38] Ruth B. Dixon, "Explaining cross-cultural variations in age at marriage and proportions never marrying", *Population Studies*, vol. 25 (July 1971), pp. 215-233; S. N. Agarwala, "Pattern of marriage in some ECAFE countries", in IUSSP, *International Population Conference, London, 1969*, vol. III, pp. 2106-2125.

[39] John Hajnal, "European marriage patterns in perspective", in D. V. Glass and D. E. C. Eversley, eds., *Population in History* (Chicago, Aldine, 1965), pp. 101-143.

[40] For example, it was estimated that in the United States of America, between 1964 and 1966, over two births in five to married women between the ages of 15 and 19 were premaritally conceived; United States Bureau of the Census, *Fertility Indicators: 1970*, Series P-23, No. 36.

[41] Judith Blake, *Family Structure in Jamaica: The Social Context of Reproduction* (New York, Free Press, 1961).

[42] See, for example, Gerd Skoe Lettenstrøm, "Fertility trends in Norway since the Second World War", in IUSSP, *International Population Conference, London, 1969*, vol. I, pp. 555-562.

or to marry only with free and full consent? And to what extent do the timing and number of marriages influence birth rates?

41. The second question is addressed first. Discounting for the moment the effect that a later age at marriage has on the woman's position within the marriage, one would expect variations in nuptiality to determine fertility patterns most strongly in societies in which birth control is not widely practised within marriage and in which the rate of out-of-wedlock births is very low. Thus, the decline of birth rates in Western Europe in the late nineteenth and early twentieth centuries can be attributed in good part to patterns of late marriage with relatively high proportions of women never marrying, while the early and universal marriage of girls in many developing countries, especially in parts of Asia and Africa, set the stage for high levels of fertility.

42. Where birth control within marriage is widely practised, the timing of marriage alone is less influential in determining completed family size. Differentials appearing early in the reproductive years as a response to marital postponement may disappear by the time childbearing is completed. Of course, if marriages are delayed in conjunction with higher education or non-agricultural female employment, family size may be kept small in an attempt to achieve a higher level of living for the couple and their existing children

43. Where *de facto* marriages are frequent, as in parts of Latin America and the Caribbean, formal marriage patterns are also less likely to have a significant effect on fertility. A large proportion of the female population, while not legally married, enters into more or less permanent consensual unions or more casual "visiting" unions in which childbearing is nevertheless accepted, and begins early. The fruitlessness of trying to regulate birth rates through the medium of legislation raising the minimum age at marriage—if such were considered desirable—can clearly be seen in this case, as in cases where young girls continue to be betrothed or married before puberty in spite of legal prohibitions. At any rate, raising the minimum from 12 to 14 years, or from 14 to 16 may have no effect at all on the average age of the woman at the time of her first birth. Indian studies suggest that marriages would have to be pushed up over 19 or 20 years to have a significant demographic impact in that country. [43]

44. The loss of parental control over the arrangement of their children's marriages, in so far as such control is associated with early and universal marriage within an extended family system placing great importance on large numbers of children, should serve to delay marriage on the average and to increase the probability of non-marriage for some women, either voluntarily or involuntarily. Courtship, after all, takes time, and an independently contracted marriage requires a degree of maturity not needed or desired of a young girl whose primary obligation is to obey the wishes of her husband and her elders. The free choice of a spouse—even with a considerable amount of parental guidance—also implies a degree of equality between husband and wife at the time of their marriage that may be essential to effective communication about family size desires and the practice of family planning.

Rights during marriage

45. According to United Nations instruments, men and women are to share equal rights and responsibilities within marriage, including equal rights and duties in matters relating to their children [44] Evidence from surveys suggests that in practice, the greater are the resources that a woman brings into her marriage in relation to those of her husband (especially in regard to her education and outside paid employment or essential agricultural production), the more equal her voice is likely to be in the major decisions of the family [45] Studies of married couples in predominantly urban areas in both industrialized and developing countries also indicate that the more equal or "non-traditional" is the division of labour (including decision-making) in the home, the more likely it is that couples will (*a*) communicate with one another about sex, family size desires and birth planning, (*b*) report a high degree of sexual satisfaction; (*c*) express a desire for small families; and (*d*) carry out their family size desires effectively. [46]

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[43] V C. Chidambaram and A. V Zodegkar, "Increasing female age at marriage in India and its impact on the first birth interval, an empirical analysis", in IUSSP, *International Population Conference, London, 1969* vol I, pp 437-447.

[44] See General Assembly resolution 2263 (XXII), article 6, and General Assembly resolution 2200 (XXI), article 23

[45] National Centre of Social and Criminological Research, Cairo, "The status [illegible] *progress report*, Jan [illegible] Yrsa Smith, "Famil[illegible] *logica*, vol 14, No [illegible] Rothschild, "A cor[illegible] satisfaction in urban Greek and French families", *Journal of Marriage and the Family*, vol 29 (1967), pp 345-352, R H Weller, "The employment of wives, role incompatibility and fertility a study among lower and middle class residents of San Juan, Puerto Rico", *Milbank Memorial Fund Quarterly*, vol 46 (1968), p 507; A Beluhan, "Survey of KAP of family planning and problems connected with motherhood in two factories in Zagreb", *Zena*, 29 (1971), p 77

[46] Attiya Inayatullah, "Impact of culture on fertility in Pakistan", in *Proceedings of the Seventh Conference of the* [illegible]

46. Patterns of male dominance within the household, where they exist, are frequently found to be associated with strong double standards of sexual behaviour and with extreme resistance on the part of husbands to their wives learning about or using female methods of contraception. Resistance is apparently often founded in the belief that wives will no longer remain sexually faithful or generally submissive to their husbands if they know how to prevent pregnancies.[47] The implicit assumption here is that birth planning can indeed be a powerful means to greater independence for the woman in the family, at least under some conditions.

47. However, there are also those situations in which a woman's status is defined almost entirely by the number of children she bears, or by the number of her sons, so that the more fertile she is, the greater is her authority. Under these conditions, a woman who remained childless or who bore only one or two could well be the object of ridicule or pity. Family planning clinics in several countries of Africa, for example, have found that women are often more interested in learning about ways to increase their fertility than to decrease it.[48] In the context of such beliefs it would be detrimental to the status of the woman to practise contraception as long as no alternative roles were possible under existing economic and social conditions. In so far as the spacing of births leads to a higher rate of infant survival, however, birth planning could increase family size and thus the woman's authority even within this pro-natalist context.

48. The crux of the argument in the relation between equality within marriage and fertility appears to be the issue of alternative roles. When non-familial activities for women are highly valued and rewarded, wives' participation in these activities tends to bring a greater degree of equality into the marriage. Greater equality tends to create an interpersonal relationship more favourable to birth planning and lower fertility, while the resulting smaller family size itself permits a closer relationship between husband and wife and a greater degree of equality. But where non-familial alternatives are not available for women, that is, where the division of labour follows highly traditional lines and the individual woman has little autonomy, then frequent child-bearing is rewarded and encouraged. A woman's prestige in the eyes of her husband, her relatives and the community at large may depend solely upon the number of children she bears.

49. The rights and duties of parents as concerns their children (and the reciprocal rights and duties of children with regard to their parents) may also play a crucial role in shaping reproductive decisions. It has become commonplace to assert that where children participate in economic or domestic production at an early age and carry obligations to support their parents in sickness and old age, the incentive for having large numbers of children is high. On the other hand, where children become primarily consumers of material resources rather than producers, the costs of a large family may override the benefits.

50. The question is less frequently asked about the effect of the division of parental rights and responsibilities on family size decisions. Speculation on the differences between husbands and wives in their desire for additional children sometimes focuses on the assumption that because women tend to carry the major responsibility for day-to-day care of children while men are removed from the immediate burdens of child care, the motivation to keep the family small should be stronger among women. But this is not always the case. Alternative hypotheses suggest that men, being more closely associated with the financial responsibilities of children and more exposed to "modern" ideas outside the home, should be more intensely motivated to limit family size. The true answer must rest in the unique cultural and structural conditions of each society which determine the division of labour between the spouses and the perceived costs and benefits to each spouse of additional children. It must also rest with the nature of parental rights and responsibilities when the marriage dissolves, either through death, divorce or desertion.

51. The foregoing discussion has centred on the nature of informal equality between the spouses. It is not possible to examine here the relationship between the number and spacing of children and the exercise of a woman's specifically legal rights and obligations within the family because there is little systematic data in this area. How does the denial of certain of her civil rights, such as the right to own, inherit or bequeath property, for example, affect her desired family size? Where only male children inherit property, does fertility increase until a desired number of sons are born? Is a woman who bears no children or who bears only one or two, or only daughters, disadvantaged under some legal systems more than others?

52. Nor has the discussion explored the relationship between fertility and equal rights within different kinds of marital unions—nuclear families as compared with extended families, monogamous as compared with polygamous unions, legal marriages as compared with consensual or more casual visiting unions. Evidence concerning the effect of these differences in family structure on fertility is inconclusive and needs to be more precisely specified,[49] along with the legal and

[47] P. O. Olusanya, "Cultural barriers to family planning among the Yorubas", *Studies in Family Planning*, vol. 37 (January 1969), pp. 15-16; Ofelia Mendoza, "What are the factors in Latin American culture that might stimulate or discourage fertility control?", in *Proceedings, Seventh Conference of the IPPF, Singapore, 1963*, p. 88.

[48] Hasan M. Husein, "Evaluation of progress in fertility control in the United Arab Republic", in *World Population Conference, 1965;* vol. II, *Fertility, Family Planning, Mortality* (United Nations publication, Sales No. 66.XIII.6), p. 143; Christian Council of Ghana, response to the United Nations questionnaire on the status of women and family planning.

[49] Couples in nuclear families do not necessarily bear fewer children on average than those in extended families in the same social setting, where one would expect child-rearing to be easier; see Moni Nag, "Socio-cultural patterns, family cycle and fertility", *Population Debate*, vol. II, part six, paras. 83-86.

(Continued on next page)

de facto rights that a woman has within each type of union.

Rights on the dissolution of marriage

53. The International Covenant on Civil and Political Rights and the Declaration on the Elimination of Discrimination Against Women call for the equal rights of the spouses at the time of marital dissolution, either through death, separation, annulment or divorce. Provision is to be made for the necessary protection of children at the time of marital dissolution In assessing the rights and responsibilities of parents the interests of the children are to remain paramount.[50]

54. The United Nations has not addressed the question whether couples have a basic right to terminate an unhappy marriage. Its instruments do declare that whatever the degree of restrictiveness a State imposes with regard to divorce, the grounds for dissolving a marriage and the rights and obligations following its dissolution should be the same for men and women

55. How might the practice of birth planning affect a woman's rights at the time of divorce, or the probability of the divorce itself? In industrialized countries with liberal divorce laws, one would expect that remaining childless, or having only one or two children, would place women in a more advantaged position because they would feel less compelled to remain in an unsatisfactory marriage and more able to manage independently. Of course, much depends upon their options outside the home. Some studies show that women who are gainfully employed have a higher probability of divorcing than do housewives,[51] and it is known that divorce tends to be more frequent among couples with no children, or with small families, even when unequal durations of marriage are taken into account. Under these conditions, birth planning should enable women more easily to exercise their equal rights at the time of divorce.

56. On the other hand, in societies where the husband has unilateral power to divorce his wife and take another, where the wife has no such power and where her options outside the home are few, the fear of repudiation can motivate women to have many children as a form of protective "insurance".[52] Thus, where sterility or the absence of sons is frequently used to justify divorce, the woman with the most children may feel the safest in her marriage—a marriage she depends upon for her survival. Eliminating the husband's power to divorce his wife at will could lighten the pressure on a wife to reproduce so abundantly.

57. The impact on fertility of marital dissolution either through divorce, annulment, desertion, separation or death depends, to a large extent, upon patterns of remarriage and upon the length of reproductive time a woman "loses" between sexual unions. Where death rates are high, women may lose up to eight or ten years, on average, due to the early death either of herself or her husband.[53] If the remarriage of widows is forbidden, as it was in Hindu tradition among the higher castes, fertility is inevitably depressed, if widows are inherited, fertility may not be reduced at all. The impact of divorce, annulment or separation also depends upon the probabilities of the woman's remarriage or her entry into another type of sexual union.

58. It is difficult, with existing evidence, to evaluate precisely the relationship between reproductive behaviour and women's rights at the time of marital dissolution as to property, support, custody over children, remarriage, etc. But such factors may play an influential role in shaping family size desires and decisions

Participation of women in public life and decision-making

59. The United Nations has declared the right of women to participate in public life and political decision-making on equal terms with men, specifically the right to vote in all elections, to be eligible for all publicly elected bodies, to hold public office and to exercise all public functions[54] Women have won the right to vote in all but a handful of countries; but in most countries—even those which guarantee equality in the law—women are poorly represented at the upper levels of decision-making in Government offices or elective bodies. Their greatest successes have occurred in countries where the Government actively promotes equality between men and women in public life, thus overcoming some of the traditional resistance to the idea of placing women in leadership positions. Elsewhere, the story is not so encouraging. Many countries point to the one or two women in conspicuously high positions while ignoring the weight of evidence on the extreme under-representation of women as a major population group.

Individual women in monogamous unions may bear more children [illegible]
on sexu [illegible]
lactation [illegible]
ensuring [illegible]
remarry [illegible]
in IUSSP, *International Population Conference, London, 1969* vol I, pp 739-747. Women in consensual or "visiting" unions may have their first sexual experiences and begin to be spaced at wider intervals and lead to lower completed family size than among married women, see G W. Roberts, "Fertility in some Caribbean countries", in IUSSP, *International Population Conference, London, 1969*, vol I, p 702, see also Judith Blake, *Family Structure in Jamaica, loc cit*

[50] See General Assembly resolution 2263 (XXII), and resolution 2200 (XXI), annex, article 23

[51] For example, H Hansluwka, "Divorces in Austria", in IUSSP, *International Population Conference, London, 1969*, vol III, p 1837

[52] [illegible]
of Women and Family Planning

[53] S N. Agarwala, "Social and cultural factors affecting fertility in India", in *Proceedings, Seventh Conference of the IPPF, Singapore, 1963*, p 102.

[54] See General Assembly resolution 217 A (III), article 21; resolution 640 (VII), annex; resolution 2200 (XXI), article 3, and resolution 2263 (XXII), article 4

60. The participation of women in public life can have the same effect on fertility as other forms of employment. Women with reduced domestic responsibilities are more free to involve themselves in community or national activities, while women whose political involvement takes them out of the home and into a world of wider interests and rewards may desire and have smaller families. But beyond this direct association between public life and reproduction among women who are themselves active participants, an expanded engagement of women in public affairs may have a far broader—though less direct and more difficult to measure—impact on fertility patterns by producing highly visible models of women who are active, competent leaders and decision-makers. Such women can be a powerful force towards changing attitudes concerning female roles and responsibilities. Even the simple act of voting itself may encourage women to have greater confidence in their own capacity for independent thought and action, a confidence that could carry over into the more private activities of sex and childbearing.

61. Of course, the participation of women in political areas specifically devoted to improving the status of women, promoting equality between the sexes or expanding birth-planning information and services can have a tremendous impact on the questions discussed above. Women are becoming increasingly active in a number of countries as policy-makers in their own organizations, highly vocal social critics and skilled pressure groups in the political arena.

62. In the field of development planning and population policies, where women have been severely under-represented in the past, many are beginning to take note of the overwhelmingly masculine character of research institutes and decision-making bodies. They are demanding that women play a larger role in determining and evaluating policies that affect their lives so intimately. In the long run, the direction of development planning and population research, along with the priorities for action, may shift considerably as the relationships between social and economic structures, equal rights for men and women, and demographic behaviour are more fully understood, and as women share equally with men in leadership positions.

THE STATUS OF WOMEN AND DEMOGRAPHIC CHANGES

63. At a time when the attention of the world is focused on the dynamics of human population growth, structure and geographical distribution, one of the most burning issues is the way in which current and projected population trends have affected, and are likely to affect, the exercise of fundamental human rights and freedoms. Within this general area of concern, questions are being asked about the differential impact of population processes on human rights as experienced by major sub-groups in society, such as racial or ethnic minorities, religious groups, children, working people and the aged. This paper is concerned with the determinants and consequences of population trends as they are affected by, and, in turn, affect the degree of equality between n and women. Is it possible to isolate particular aspe of population processes in order to identify their gene influence on women's status now and in the futu More specifically, how is the position of women in t family, in education, in employment, and in public l shaped under different conditions of population grow structure and distribution? What demographic con tions appear to facilitate equality between the sexes a what conditions appear to hinder it?

64. It is easy to point to examples of countries w very rapid rates of population growth in which t advancement of women is apparently severely hinder by the burden of a high dependency ratio and extreme population pressures on scarce material a social resources that limit their opportunities, not or absolutely but differentially in comparison with me There are also highly visible examples of countries wi very low birth rates in which women appear to ha achieved a rather high level of equality with me especially in education and employment, and in whi adequate resources are invested in health care, soci security, child care, maternity benefits and oth essential social services. However, beyond these tv extremes it is almost impossible to evaluate the impa on the status of women of different rates of populati growth in the middle range. And even including tl extremes, it is obvious that demographic conditions m play only a minor role in determining the absolute ar relative positions of women in the family and in socie at large, as compared with the role played by econom conditions, stages of development, political and soci structures, cultural values and beliefs, and government priorities for policy and action.

65. Moreover, a vast number of questions remai unanswered concerning the effect of specific populatio trends on the status of women and on their potential fo equality with men. What, for example, is the effect o changing mortality conditions? As health care, sanitatio and nutrition improve, one immediate effect should b to make childbearing safer. But the trend could b disadvantageous if it means an "unwanted" increase i fecundity among women who are already overburdene with family responsibilities and who lack the knowledg and means to prevent further pregnancies. And a highe survival ratio among infants, if it occurs at a time o food shortages, could mean that female children are eve more likely to be deprived of adequate nourishmer when males are given priority for scarce resources withi the family.

66. What effect does urbanization have on the statu of women? In rural areas with a heavy out-migratio of males, the remaining female population may "im prove" its status by taking over many activities formerl performed by men and by acquiring a major decision making role in the family and in the community. O could the consequences mean only a double burden fo the women left behind and an increased competition fo the attention of the remaining males?

67. When women move to cities, are their rights likely to be expanded or contracted, and in what ways? Under some conditions, the move may represent a real freedom from the constraints and traditions of village life and an opportunity for higher education, employment and new independence. Under other conditions, it may represent an isolation from a formerly supportive environment, loss of child care and household assistance, and a new division of labour between husband and wife even more rigid than the one left behind. Does the transition from extended to nuclear family, from polygamous to monogamous union, from early marriage to late marriage or non-marriage, from arranged match to free choice always represent an improvement? Or can it sometimes expose women to the possibility of greater male domination or domination of a subtler type? Can the expanded gainful employment of women outside the home in most countries of the world always be taken as a sign of their emancipation, or does it often merely add still another form of domination?

68. There appears to be little doubt that a continued high rate of population growth can have serious implications in retarding economic and social development, with accompanying repercussions on the status of women. This is particularly true in the areas of education, training and employment. In most countries, social services assisting parents with family responsibilities are still in short supply; the positive value of day-care centres as a means of raising women's aspirations and releasing them for education, economic production and political participation is not yet fully recognized. Some critics of current development programmes have expressed the fear that under the pressure of competing economic priorities, women's right to equal participation with men in all aspects of social and economic development will be sacrificed to preferential treatment for males in training and employment, leaving women relatively untouched in their traditional roles Yet, the participation of women is essential to the developmental process and of great and immediate consequence. Women can be a driving force in society or they can retard progress. Much depends upon the priorities set by development planners.

69. Policy-makers need to take more careful note of the demographic relevance of equality between the sexes Mention has been made of extent to which equality in the spheres of education, employment, the family and public life appears to be associated with more effective birth planning and with a smaller desired family size among women who marry. Indeed, in some countries where women come closest to exercising their equal rights, birth rates have reached very low levels

70 But regardless of the demographic conditions or goals of any particular country, the universal human rights aspects of birth planning and the status of women must be affirmed. Constraints on the exercise of the right to decide whether, and when, to bear children affect the exercise of other rights in marriage and the family, education, employment and public life. They may affect directly the right of women and of children to physical and mental health. At the same time, constraints on women's right to equality with men in all these spheres may in turn severely limit the exercise of the right to decide freely and responsibly on the number and spacing of their children.

71. The aim of any population policy must be the enrichment of human life, not its restriction. Thus, the provision of family planning services is no substitute for radical social, economic or political reform, but must be seen as an integral and simultaneous element among a variety of policies and programmes designed to promote the full exercise of all fundamental human rights and freedoms.

72. A policy of raising the status of women and promoting equality between men and women, which expands the range of human rights and freedoms, is an end in itself as clearly stated in the United Nations Charter and in many other international documents It may also be a significant means to achieve desired population goals, a question only recently provoking serious interest But the essential purpose remains the full utilization of the talents of all of a society's members and the creation of a new basis for free and happy relations between men and women

PROTECTION OF HUMAN RIGHTS AND MEASURES DIRECTED TOWARDS REDUCTION OF MORBIDITY AND MORTALITY IN THE UNION OF SOVIET SOCIALIST REPUBLICS *

S. Y. Chikin **

1. The relationship between mortality and the demo-raphic, biological, economic and social aspects of uman activities, testifies to the importance of these ıctors as criteria in the realization of the human rights) good health and a full life.

2. The nature of the changes in the mortality of opulation in the centrally planned economies and in the ·ee-enterprise economies is not identical. The reasons nderlying these changes are also different. The elimina-on of distinctions in mortality among various social roups under socialism is determined by a gradual bliteration of differences in the living conditions of the opulation in all these groups. It has been achieved on ıe basis of the most profound and, primarily, economic ·ansformations in the countries of developed socialism.

3. The methods of production and the related labour ctivity, the level of material well-being, the level of opulation development, the traditions and customs of ıe population—all these social factors exert a great ıfluence on the mortality indexes.

4. The Soviet State considers population health rotection to be one of the most important tasks legally mbodied in the Constitution of the Union of Soviet ocialist Republics. The citizens of the USSR have the ght to material subsistence in old age, and also in case f disease and loss of ability to work.

5. This right is ensured by a vast development of ɔcial insurance for industrial and office workers at the xpense of the State, free medical assistance to working eople and the placing at the people's disposal of a wide etwork of health resorts.

6. In the socialist society, for the first time in the istory of the world, the entire population is fully rovided with free and qualified medical assistance. The oviet public health services represent a wide system of ıeasures implemented by the socialist State and the oviet public and directed towards the betterment of eople's health, prevention of disease, provision of ealthy conditions for work and private life, a high apacity for work, decreased mortality and promotion f a higher life expectancy for the Soviet people. This determines the social and sanitary legislation of the Soviet State, as well as the practical activities of the medical and sanitary State-run organizations. Apart from curative, preventive and sanitary services to the population, the system of Soviet public health also covers training and extension courses for medical personnel and research in the field of medicine.

7. The State plan for the development of the people's economy determines the progress of the public health system, in accordance with the tasks of continuous improvement of medical services to the population, and the State budget guarantees conditions for its implementation. The unified State plan of public health development is prepared on the basis of requirements, suggestions and proposals by the various republics, territories, regions and districts, according to the strength and structure of their populations and the plans for the development of their economies and culture.

8. The socialist régime has established the most humane system of free and fully accessible medical help. The Soviet physician is the bearer of the very spirit of this advanced system, its champion and organizer, the servant of the people, and this delineates his whole attitude towards the patients.

9. The availability of medical assistance to the population is inconceivable without an adequate number of medical doctors. The very right to free medical aid cannot in fact be realized if it is not backed up by the training of a sufficient number of physicians to meet the needs of all the people who apply for medical help.

10. By the beginning of 1973 there were, in the USSR, 732,000 practising physicians of all specialities, or more than one fourth of all the practitioners throughout the world. The number of doctors per each 10,000 of the population amounted to 29, which is considerably in excess of their number in any other economically developed country. In the pre-revolutionary period, the country had only 28,000 practitioners of all specialities, or 1.8 doctors per 10,000. Thus, the availability of medical help has increased 16 times. In subsequent years, the number of doctors will grow considerably, in absolute as well as in relative figures, as estimated per 10,000 of population, which will help make medical assistance still more accessible and effective.

11. Over and above their regular income, the industrial and office workers in the USSR receive, at the

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** Ministry of Public Health of Russian Federation, Moscow, 'nion of Soviet Socialist Republics.

State's expense, tangible payments out of the public consumption funds, along with the free medical help.

12. The payments and deductions granted to the population from the public consumption funds are constantly increasing. In 1972, the expenditure on social insurance payments, benefits and allowances, pensions, students' scholarships, free education, medical care, maintenance of boarding-schools, crèches, kindergartens, sanatoria, rest-homes and homes for the aged, and other related expenses amounted to 73 thousand million roubles

13. Freer and better education in the Soviet Union has been highly instrumental in eliminating many diseases and reducing the mortality caused by such diseases, since a literate person treats his health in a more rational way, firmly observes hygienic rules and participates more actively in preventive measures

14. The same could be said in connexion with the 43 million pensioners. The concern of the State for their well-being is of great significance in reducing many diseases and mortality in general.

15. The right to free medical assistance and its actual availability to the entire population is guaranteed by the fact that the State meets all the expenses for the establishment of the material basis for the public health system and the maintenance of medical institutions, including the salaries of all the medical personnel

16. The rapid construction of dwellings has provided the urban population with enlarged living-space, increasing it from 6 m² of total (useful) area per inhabitant (prior to the revolution) up to 11.4 m² (early in 1973)

17. Taking into consideration the fact that every person spends more than half his life in his home, the solution of the housing problem is directly related to the improvement of people's health and the decrease of mortality due to many diseases. Further improvement in living conditions will promote the strengthening of the people's health and the augmentation of their life expentancy.

18. The increase in production of food and its more rational distribution resulted in a higher *per capita* consumption, in the years of Soviet power, of meat and fat (1.8 times), milk and dairy products (1.9 times), fruit and berries (3.3 times), eggs (3.9 times), fish (2.3 times) and sugar (4 8 times) At the same time, the consumption of bread and cereals decreased by nearly 30 per cent, which is indicative of more rational nutritional habits among the population The increased protein content in food rations has contributed to a better physical development of the Soviet people, an improvement of their health and a higher resistance to many diseases.

19. Great attention is paid to physical culture and sports as important prerequisites to improving health The material basis for these activities is constantly being extended. Almost every fourth person in the 10-60 age group in the USSR systematically practises physical exercise.

20. [illegible]

mortality among the population has changed sharply. A a result of the appropriate measures taken, morbidit from contagious diseases gradually declined, and for long time there has been no incidence of smallpo Asian cholera, plague, parasitic typhus or trachom while many other infectious diseases have almost bee eliminated. As compared with 1940, the number of case of enteric fever and paratyphus has decreased eigh times, diphtheria, 453 times, and whooping cough, 1 times.

21. Naturally, this trend was reflected in the mor tality of the population. Compared with 1913, amon urban dwellers, mortality resulting from diphtheria wa 650 times lower, that from whooping cough and enteri fever, nearly 400 times, from measles, 90 times, an from tuberculosis more than 15 times. An especiall steep decrease was observed in mortality from in fectious diseases among children.

22. The main changes that have affected th dynamics and nature of mortality can be summarized a follows.

(*a*) A considerable decrease of the mortality, abov all, in the children's age groups;

(*b*) A change in the extent and character of diseases related to an essential reduction in the mortality cause by contagious and parasitic diseases, achieved throug the success of medical sciences and the more effectiv organization of the public health protection, this proces having exerted an exceptionally favourable influence o the decrease of mortality in comparison with the pre revolutionary years when infectious and parasiti diseases took a heavy toll of victims,

(*c*) A change in the nature of pathology among th population of the economically developed countries afte the Second World War, when there appeared a numbe of new factors adversely influencing public health, suc as excessive pollution of the air, a wide use of chemica substances in food-stuffs, radiation and new labou conditions connected with the mechanization an automation of production;

(*d*) A sharp decrease of infectious and epidemi diseases, together with an increased mean life ex pectancy and an ever intensified aging process amon the population, have resulted in a growing share o chronic diseases that have assumed leading importanc in the pathology and causes of population mortality.

23. The specific modifications in the mortalit indexes in the USSR are enumerated below.

24. Owing to the new social and economic condi tions and the measures taken for the development o public health services, morbidity and mortality amon the population had been considerably reduced alread by 1926 With the further growth of the people's welfar and the improvement of medical care, subsequen decreases in morbidity and mortality took place. I

1972, the death rate was 8.5 per 1,000 as against 29.1 in 1913. No other country in the world had such a low rate of mortality decrease. Now the USSR stands among the countries with the lowest mortality rates.

25. The Soviet Union has achieved a great and incomparable success in the reduction of infant mortality, which systematically decreased. In 1940, the share of infant mortality in total mortality throughout the country was 32.6 per cent; by 1965, the share of infant deaths below one year of age, compared with the total, decreased to 7 per cent. In 1972, the share of infant mortality in total mortality comprised a mere 5.2 per cent.

26. Especially striking was the change in the average life expectancy, from 32 years in 1897 to 70 years at the current time. In the entire set of indexes characterizing population vitality, average life expectancy occupies a special place. By its very numerical expression this index describes the conditions of existence, labour, private life and medical care, and the effectiveness of social and medical measures directed towards public health protection.

27. The increase of average life expectancy in the country was achieved, first of all, through impressive decreases in infant mortality (aged below one year), and in mortality in the first, second, third and fourth years of life, as well as in the young and middle age groups (up to 60). In its turn it was related to the achievements in the stuggle against contagious diseases, tuberculosis, maternal mortality and a number of other diseases that had frequently caused deaths in the infant, young and middle years of life.

28. The decrease in mortality and the extension of the average life-span of the population were undoubtedly important factors advancing scientific and technological progress. In the past, because of a shorter average life-span, a man could give to the society a much smaller return and he did not have time for complete and multi-sided development.

29. In tsarist Russia, infant mortality was especially high, and people's life span was considerably shorter. According to estimates, at that time almost one half of the children died by the age of 15, only 40.4 per cent survived to 45 years and only 29.3 per cent to the age of 60.

30. Now the situation has radically changed: out of 1,000 simultaneously born children, 967 reach the age of 15 and 961 reach the age of 45. By the age of 60, this number shrinks to 780, and by 70, to 627.

31. The current level of mortality in the USSR, as in other economically developed countries, is mainly determined by cardio-vascular diseases and malignant tumours and other growths. These two groups of diseases constitute 64 per cent of all lethal cases. In the economically developed countries, diseases of the blood circulation system are first among the causes of death and currently comprise 40-50 per cent of all the lethal cases due to diseases, whereas in the USSR they account for 48 per cent. The growth of mortality due to cardio-vascular diseases depends to a considerable extent upon the process of population aging.

32. Reiterating the rights of Soviet man to accessible medical assistance, it should be specially emphasized that in the USSR the most modern accomplishments of medical science are widely incorporated in daily practice for treatment of diseases and reduction of disease-caused mortality. Currently, the problem of fighting cardio-vascular diseases has acquired the most urgent significance.

33. Also of great social and medical importance is the problem of oncological diseases. Within the framework of the Soviet public health system, there exists a ramified special oncological service for the prevention, early diagnosis and treatment of oncological diseases.

34. As is known, the early diagnosis of cancer is the guarantee of its successful treatment. For this purpose, x-ray (recently with Roentgen-optical or electronic amplifiers), radiological, ultrasonic and endoscopic apparatus as well as the latest instruments and other achievements of modern physics and related fields of science and technology are employed.

35. In the struggle against the spread of cancer, an outstanding role is played by large-scale preventive checks among the population. They are intended for diagnosis of pre-cancerous conditions and diseases. There are over 1,360,000 people now in the Soviet Union who have been cured of malignant growths through the help of modern ways of treatment and who pursue their studies and work. In the USSR, as in all the economically developed countries, malignant growths place second among the causes of death (15 per cent).

36. Among the measures for further reduction of over-all morbidity and mortality an important place is held in the USSR by early preventive checks and dispensary observations of the population. This is a peculiar characteristic of Soviet public health system. Execution of these measures permits constant control of the people's health by timely diagnosis of various diseases.

37. The dispensary observations are directed not only at patients requiring qualified medical treatment and prevention of complications, but at large groups of the healthy public with a view to early diagnosis and prevention of diseases. These observations of patients have become very popular among urban and rural out-patient medical institutions. The situation over recent years testifies to an ever-growing role of these principles of medical assistance to working people as an important prerequisite of preservation of the health of the Soviet population, the ability to work, active participation in public life and the total growth for every individual.

38. Recently, in the Soviet Union, much attention has been paid to the organization of specialized medical assistance to the population. The main role in the

provision of such assistance to the rural population is played by the regional, territorial and republican hospitals. In many regions, territories and autonomous republics, there currently are major hospitals with a capacity for 1,000 bed-patients.

39. Of large importance in providing specialized medical help to the urban and rural population are specialized dispensaries: oncological, anti-tuberculosis, skin and venereal disease treatment and others.

40. The Soviet socialist standards and norms designed for protection of human rights are wider and more profound, in their contents and the extent of their practical application, than the international standards governing this sphere.

41. The main principles for the development of public health laws were formed at the inception of the Soviet State and found vivid expression in the Basic Laws of the USSR and the Union Republics concerning the public health system, which were approved by the Supreme Soviet of the USSR in December 1969

42. The recommendations of the twenty-third session of the World Assembly on Public Health to the effect that the proclamation of the responsibility of the State and the public in respect of public health protection implemented on the basis of a complex of social and economic measures directly or indirectly contributing to a higher level of health for the population through the establishment of a national system of public health services derived from a single national plan and local plans, and also by way of a rational and effective utilization for the needs of public health of all the efforts and means that can be allotted by society for this purpose at every given stage of its development, have been put into practice in the USSR to the full extent.

43. At the same time, many developing countries are lacking resources for the implementation of these measures. In this respect, major significance may be attached to the recent proposal by the USSR, approved by the twenty-eighth session of the General Assembly, on the curtailment of military budgets and the transfer of funds thus accumulated to help the developing countries.

44. A rational utilization of resources for the development of the economy, food production, establishment of medical institutions, training of doctors and medium medical personnel would largely help assist the ever-growing population in exercising the human rights proclaimed by the United Nations and in prolonging their lives and avoiding premature deaths.

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LAS CONSECUENCIAS DEL EJERCICIO DE LOS DERECHOS HUMANOS PARA LAS MIGRACIONES INTERNAS *

Oscar Cornblit **

El derecho a circular libremente

1. Cada una de las declaraciones de las Naciones ıidas acentúa y promueve el ejercicio creciente de derechos humanos fundamentales. Estos derechos manos implican una concepción esencialmente manística de la persona. A su vez, esta concepción ıme una tradición cultural que se ha ido abriendo so lentamente y con enormes dificultades a través tiempo, a pesar de los serios reveses sufridos rante períodos de represión, persecución y totalitamo acentuado.

2. La Declaración Universal de los Derechos ımanos proclamada por las Naciones Unidas repreıta sin lugar a dudas una afirmación en ese sentido. preámbulo de la Declaración lo asevera con gran cuencia proclamando como "la aspiración más elela del hombre, el advenimiento de un mundo en el los seres humanos, liberados del temor y de la seria, disfruten de la libertad de palabra y de la ertad de creencias"[1].

3. Con este concepto de sociedad formulado por Naciones Unidas es comprensible que sus diferentes oluciones consideren especialmente las migraciones.

4. En primer lugar el párrafo 1 del Artículo 13 de Declaración Universal de Derechos Humanos declara derecho a circular libremente:

"Toda persona tiene derecho a circular libremente y a elegir su residencia en el territorio de un Estado."

la misma manera el párrafo 1 del Artículo 12 del cto Internacional de Derechos Civiles y Políticos ma el mismo derecho para "todos" y las restricnes que se especifican son sólo las que se derivan las necesidades de convivencia social, orden blico, derechos y deberes de los demás y el bienestar ıeral en una sociedad democrática[2]. Tales restricnes por otra parte, deben conciliarse con los derechos establecidos en los otros artículos de la Declaración Universal de Derechos Humanos o el Pacto Internacional de Derechos Civiles y Políticos.

5. Otras restricciones a la libertad de circular libremente provienen de la detención de una persona en virtud de causas legalmente fundadas y dictadas por la autoridad jurídica competente[3]. De la misma manera, situaciones de emergencia nacional, o prestaciones de servicios que formen parte de las obligaciones civiles normales de todo ciudadano constituyen limitaciones análogas al principio general de libertad de desplazamiento y de elección del lugar de residencia y de trabajo.

6. Dentro de la misma tónica, debe entenderse que los derechos a circular libremente dentro del territorio de una nación se aplican y valen tanto para los nacionales como para los extranjeros. Por una parte la Declaración Universal de Derechos Humanos establece en el Artículo 2 que "Toda persona tiene todos los derechos y libertades proclamados en esta Declaración, sin distinción alguna de raza, color, sexo, idioma, religión, opinión política o de cualquier otra índole, origen nacional o social, posición económica, nacimiento o cualquier otra condición". Dado que el Artículo 13 en su párrafo 1 declara que "Toda persona" puede circular libremente es claro que no puede hacerse ninguna discriminación basada en el origen nacional de los individuos; por otra parte, este punto fue discutido expresamente en la Tercera Comisión de la Asamblea General donde se presentó una enmienda tendiente a limitar el derecho de circulación exclusivamente a los nacionales, que fue rechazada[4].

7. El párrafo 1 del artículo 2 del Pacto Internacional de Derechos Civiles y Políticos expresa el mismo principio especificando que todos los estados tienen la obligación de garantizar a todos los individuos dentro de su territorio los derechos reconocidos en el Pacto sin discriminación alguna basada en el origen nacional entre otras posibles causas. En el Pacto sin embargo se exceptúa de esta obligación con respecto al origen nacional en el caso de una emergencia pública, que amenace la existencia misma de la nación. Debe tenerse en cuenta sin embargo que esta restricción sólo es

* Documento E/CONF.60/SYM.IV/7 preparado para el ıposio sobre las relaciones entre la población y los derechos nanos, Amsterdam, 21 a 29 enero de 1974.

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[1] Preámbulo de la Declaración Universal de Derechos Humos. Resolución 217 A (III) de la Asamblea General, de de diciembre de 1948.

[2] Las restricciones se describen en el párrafo 1 del Arılo 29 de la Declaración Universal de Derechos Humanos n el párrafo 3 del Artículo 12 del Pacto Internacional de rechos Civiles y Políticos.

[3] Párrafos 1, 2, 3 y 4 del Artículo 9 del Pacto Internacional de Derechos Civiles y Políticos.

[4] *Documentos Oficiales de la Asamblea General, tercer período de sesiones, Tercera Comisión,* 120a. sesión.

aplicable en casos excepcionales y mientras las condiciones de emergencia tengan validez. En situaciones normales se restituyen totalmente las libertades de desplazamiento y residencia libre.

8 También la Convención Internacional sobre la Eliminación de todas las Formas de Discriminación Racial subraya los mismos principios y derechos mencionados en las otras declaraciones El artículo 5 dispone que todos los derechos de que gozan los individuos valen sin distinciones de raza, color u origen nacional o étnico; incluido en estos derechos está el apartado i) del párrafo *d*) del mismo artículo, que afirma que toda persona tiene "El derecho a circular libremente y a elegir su residencia en el territorio de un Estado"

9. Sin embargo, debe tenerse presente que hay una excepción a esta homogeneidad de derechos cuando las naciones establecen distinciones entre ciudadanos y no ciudadanos En el párrafo 2 del Artículo 1 de la ya mencionada Convención Internacional, se admite la restricción de este caso particular de libertad de circulación, diciendo. "Esta Convención no se aplicará a las distinciones, exclusiones, restricciones o preferencias que haga un Estado parte en la presente Convención entre ciudadanos y no ciudadanos"

10 Otras resoluciones y declaraciones de las Naciones Unidas señalan en el mismo sentido, como el estatuto de Nuremberg que considera la deportación de poblaciones civiles como un crimen de guerra[5]. En el mismo sentido deben interpretarse otras disposiciones, como las que se oponen al trabajo obligatorio, porque, en última instancia, llevan consigo la obligación a residir en un determinado lugar. Considerando este hecho, el párrafo 2 del Artículo 5 de la Convención sobre la esclavitud, reconoce que es difícil hacer efectiva la abolición del trabajo obligatorio sin un período previo de transición De este modo, declara "que, mientras subsista ese trabajo forzoso u obligatorio, no se empleará sino a título excepcional, con una remuneración adecuada y a condición de que no pueda imponerse un cambio del lugar habitual de residencia"[6]

11 Se hace referencia a la misma cuestión en el párrafo *b*) del Artículo 1 del Convenio sobre la abolición del trabajo forzoso en el que "Todo Miembro de la Organización Internacional del Trabajo que ratifique el presente Convenio se obliga a suprimir y a no hacer uso de ninguna forma de trabajo forzoso u obligatorio.. Como método de movilización y utilización de la mano de obra con fines de fomento económico"[7].

12 Esta especificación es importante porque señala taxativamente una norma que complementa la de libertad de circulación y que es la prohibición de desplazamiento forzado, aun cuando este desplazamiento, implícito eventualmente en el concepto de movilización, se realice aparentemente con objetivos ulteriores de bienestar general, como es el de desarrollo económico.

13. Las Naciones Unidas o sus agencias especializadas sustentan invariablemente el principio de la libertad sin restricción de desplazamiento de los habitantes de un país dentro de sus fronteras, al concebir la libertad humana en todos sus aspectos como una de las más altas aspiraciones del hombre, y también por medio de sus resoluciones específicas referentes a las migraciones Las limitaciones que hemos señalado no alteran el fondo de la cuestión y son excepciones fundadas en situaciones particulares que deben ser razonablemente justificadas

Características históricas de las migraciones

14 El avance del proceso de industrialización en todo el mundo ha robustecido la significación de las migraciones dentro de la dinámica general de la población mundial En estos movimientos de la población, los que se refieren a las migraciones externas son los que más llamaron la atención a partir del primer cuarto del siglo pasado y fundamentalmente después de 1850

15. A partir de 1930 aproximadamente y sobre todo en las últimas décadas, la significación de las migraciones internas aumenta considerablemente en relación a las migraciones externas, muy especialmente en las regiones del mundo donde se encuentran los países menos desarrollados, es decir, América Latina, Asia, Africa[8] Después de 1930 las migraciones de Europa hacia países americanos disminuyen notablemente o cesan por completo, aunque hay algunas excepciones que tienen bastante importancia.

16 Cobran entonces mucha significación las grandes migraciones internas. No debe pensarse sin embargo, que las migraciones internas fueron inexistentes en los períodos anteriores

17. Si bien afectados por un contexto político social y económico muy diferente al que podría exhibir América Latina, los países de menor desarrollo de diferentes regiones exhiben un pronunciado incremento de las migraciones internas en las últimas décadas, vinculado naturalmente a las grandes transformaciones de la economía mundial[9]. Hay que tener en cuenta sin embargo, que si bien el factor económico es en general el determinante más importante de los movi-

[5] Confirmado por la Asamblea General en su resolución 95 (I) de 11 de diciembre de 1946

[6] Convención sobre la esclavitud Ginebra, 24 de septiembre de 1926

[8] Entre 1820 y 1930, los Estados Unidos recibieron el 61 4 por ciento de la migración mundial externa, les siguen Canadá con el 11.5 por ciento, Argentina con el 10 1 por

mientos de población, hay factores de tipo sociocultural: religiosos, de parentesco, cultura urbana; y políticos: descolonización, guerras y rebeliones, que pueden alcanzar una significación muy grande. En Africa han tenido gran influencia factores de este tipo: en Argelia se produce el éxodo en gran escala de la población de origen europeo, y en Kenya de la población de origen asiático [10].

18. En vinculación con esto debe recalcarse que, las migraciones tanto internas como externas están ligadas fundamentalmente al proceso de urbanización con amplias variaciones y matices dependiendo del lugar y región del mundo donde se producen. Es decir, que en última instancia el desplazamiento de población tiene como destino final la ciudad; el origen, en cambio depende mucho de la etapa del proceso en que se encuentra cada país, puede ser el campo, o poblaciones más pequeñas. Las migraciones han representado por ejemplo el 70 por ciento del crecimiento urbano en Venezuela (1941-1950), el 68 por ciento en Colombia (1938-1951) el 49 por ciento en Brasil (1940-1950) [11].

19. Al mismo tiempo el proceso de urbanización ha producido un incremento acentuado del tamaño de las ciudades, hecho que a su vez ha representado un incremento agudo de la dominación de la cultura urbana sobre todo el ámbito de la nación. El modo de vida de la ciudad repercute a través de su hegemonía económica, de los medios de comunicación y de la influencia de las instituciones urbanas de todo tipo sobre la vida rural.

20. Todo indica que este incremento de la urbanización, entendido no sólo como un aumento de residentes en zonas urbanas, sino también como un fuerte desarrollo de la hegemonía de la vida urbana a través del crecimiento todavía más pronunciado de las grandes metrópolis, seguirá con ritmo ascendente, aunque con fisonomías marcadamente diferentes de acuerdo al estadio respectivo a que haya llegado cada país.

21. La tasa de crecimiento urbano por la que están pasando los países de menor desarrollo no tiene equivalentes históricos en cuanto a magnitud, en los períodos análogos de los países actualmente desarrollados. Mientras por ejemplo, en los Estados Unidos se dio una tasa anual de crecimiento urbano entre 1890 y 1910 de alrededor de 3 por ciento, las cifras actuales para los países de menor desarrollo son 5.5 por ciento para el este Asiático, 4.7 por ciento para Africa y 4.6 por ciento para América Latina, dándose en algunas subregiones tasas considerablemente mayores todavía [12].

22. Estas diferencias se deben en parte a una constelación compleja de fenómenos, entre ellas indudablemente la disminución de la tasa de mortalidad, pero hay otras que derivan de las características explosivas que adquiere la industrialización para naciones no desarrolladas en el estado actual de desarrollo tecnológico mundial. Las disparidades tecnológicas y de capital son actualmente tan grandes que hacen que la introducción de un nuevo sector industrial en un país sea necesariamente un factor más desequilibrado de lo que lo fue en el siglo pasado, cuando se realizaba según los recursos y la capacidad innovadora de cada país.

23. Dadas las bajas tasas de población urbana que todavía evidencian algunos países de menor desarrollo, es de suponer que los fenómenos de desplazamientos migratorios continuarán todavía durante muchas décadas, si es que las tendencias a la industrialización se mantienen vigentes como hasta ahora.

24. Otra característica que se ha señalado como distintivo del proceso de urbanización en los países de menor desarrollado es el de la primacía de la ciudad más grande en la jerarquía urbana. Para muchos autores ésta es una consecuencia del carácter subordinado de las economías de los países periféricos frente al poder hegemónico de los países centrales.

25. Aunque hemos recalcado la preeminencia del proceso de urbanización en la dinámica de las migraciones internas, no por eso debemos dejar de lado otros tipos de desplazamiento de población, ya sea entre ciudades de un grado de urbanización semejante, entre zonas rurales, e incluso de zonas de alta urbanización a otras de menor nivel.

26. Los desplazamientos de población entre zonas rurales han sido muchas veces intensos en el pasado y varios estudios atestiguan las importantes consecuencias sociales y políticas que ha aparejado su existencia [13]. Lamentablemente no todos los tipos de desplazamientos han recibido la misma atención y por eso hay más opinión formada sobre los fenómenos urbanos ligados a las migraciones que sobre otro tipo de procesos.

Factores determinantes y consecuencias de las migraciones

27. Para comprender la concatenación causal de las migraciones y las consecuencias que han tenido sobre la condición social de los habitantes de un país, los estudios se han centrado sobre los determinantes de la migración, sus características, y sus consecuencias sobre las regiones de origen y destino.

28. Debemos señalar en este sentido que el cuadro que se obtiene a través de los distintos estudios que se

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[10] W. Hance *op. cit.* pág. 183.

[11] Véase P. M. Hauser, recopilador, *La urbanización de América Latina*, 1961.

[12] Véase Harley L. Browning, "Primary variation in Latin America during the Twentieth Century", en Schaedel y otros, *Urbanización y proceso social en América*, Lima, Instituto de Estudios Peruanos, 1972, pág. 55; y Manuel Castells, "La Urbanización dependiente en América Latina", *Imperialismo y urbanización en América Latina*, compilado por M. Castells, Barcelona, Gili, 1973, pág. 12.

[13] Durante el período colonial, el rasgo permanente de lo que ahora es Bolivia y ciertas partes del Perú fue una tasa muy alta de movilidad horizontal de la población. En algunas regiones, la proporción de población migrada podía alcanzar un nivel del 30 por ciento o 40 por ciento. Véase Oscar Cornblit, "Society and Mass Rebellion in Eighteenth-Century Peru and Bolivia", *St. Antony's Papers*, No. 22, Londres, Oxford University Press, 1970.

están llevando a cabo es una extrema diversidad de las situaciones emergentes. Esto ha llevado a afirmar a algunos autores que no existe una teoría elaborada sobre migraciones internas Sin embargo, más bien debe *decirse que no existe todavía suficiente cantidad de* estudios en situaciones comparables que permitan la formulación de generalizaciones empíricas útiles para la construcción de modelos multivariados sobre el tema[14].

29. Dentro de las determinantes de las migraciones, las que se refieren al tipo rural-urbano han merecido especial atención Con respecto a éstas se ha señalado que un factor causal muy importante es el carácter de la estructura agraria Es decir, allí donde prevalece el latifundio o la productividad rural es baja, hay menor afincamiento de la población en la tierra y esto constituye un factor de expulsión de los habitantes de las zonas rurales El crecimiento demográfico se traduce en una presión creciente sobre el suelo, y allí donde las posibilidades de ocupación son escasas ya sea por la estructura de tenencia o por falta directa de tierras aptas para la producción, la población migra[15]

30. Tal punto de vista ha sido cuestionado por otros autores, teniendo en cuenta que en muchos casos no es la población rural que está en peores condiciones sociales y económicas la que migra, sino a la inversa[16]. Esto hace suponer que la selectividad migratoria de las zonas rurales tiene características muy direfentes de acuerdo con la coyuntura económica particular por la que atraviesa la zona. Es decir, en las regiones donde la coyuntura económica es mejor, la selectividad tiende a ser positiva y emigran personas de más alta condición social[17].

31. El análisis clásico de las motivaciones para *migrar divide a los factores determinantes en factores* económicos de expulsión y de atracción. Explicaciones demasiado rígidamente ceñidas a este punto de vista han sido criticadas por varios autores, ya que no son suficientes para dar cuenta de las características que interesan en el análisis de la población migrante. Surge la necesidad de introducir variables de tipo antropológico, normativo y psicosocial[18].

32. De cualquier manera, el peso de las variables de tipo económico es fundamental, por lo menos a través de la mayoría de las encuestas que se han practicado en América Latina y otras partes del mundo donde las respuestas dadas correspondieron a razones económicas.

33. Surgen, sin embargo, otras causas de migración como educación, o problemas familiares. Por otra parte, si bien la motivación de trabajo es la que surge con mayor frecuencia en los entrevistados de todos los sectores sociales es más acentuada entre aquellos de menor condición social.

34 Los investigadores consideran en general con muchas reservas los estudios realizados sobre las causas de las migraciones, ya que muchos de los individuos entrevistados no pueden establecer con precisión las razones que los llevaron a migrar, especialmente si *migraron muchos años atrás En líneas generales puede* decirse que son muchos los factores que precipitan la decisión de migrar, factores además que se extienden a lo largo de un amplio período de tiempo que incluye acontecimientos del pasado más lejano ligados a la infancia del individuo, y otros acontecimientos muy racientes referidos a situaciones de trabajo, de política o familia.

35 *En cuanto a las características de las migraciones* se han hecho estudios que han tratado de delimitar las áreas de origen, volumen, distancia, y selección de las migraciones entre otras cosas Se ha hecho hincapié en la migración rural-urbana que constituye la forma de migración más significativa en la mayoría de los países de menor desarrollo

36. Sin embargo, debe señalarse que otras formas de desplazamiento de tipo rural-rural, o urbano-urbano son también muy importantes[19] Merece también especial atención la migración de retorno En algunos estudios se encuentran porcentajes significativamente altos de retornantes entre los migrantes Dentro del estudio de las características de las migraciones cobra importancia el examen de la selectividad de origen de los migrantes. Es decir, ¿los migrantes son de extracción más alta que los no migrantes en las comunidades de las que parten; no evidencian ninguna diferencia, o tienden a seleccionarse por sus características negativas? La opinión de numerosos autores es que la selección es positiva, tal como la han demostrado diversos estudios en América Latina y Asia

37. En cuanto a las consecuencias de las migraciones internas éstas han sido estudiadas abundantemente en la literatura científica y periodística, muy especialmente

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[14] Sobre esta cuestión véase Oscar Cornblit, "Political coalitions and political behaviour: a simulation model", *Experimentation and Simulation in Political Science*, compilado por Laponce y Smoker, Toronto, University of Toronto Press, 1972, págs 225-258

[15] Véase Héctor M [illegible] *dad argentina*, [illegible] ns G. Phillips, [illegible] *Development* [illegible] 59), págs 406 [illegible]

[16] Véase Ashish Bose, "The process in south and southeast Asia", *Urbanization and National Development*, compilado por Jakobson y Prakash, Beverly Hills, Sage Publications, 1971, pág 99

[17] La información sobre esta cuestión es escasa o casi inexistente Véase Jorge Balán "Migrant native socio-economic differences in Latin American cities- A structural analysis", *Latin American Research Review*, vol IV, No 1 (primavera de 1969), pág 8

[18] Véase Gino Germani, *Sociología de la modernización*, Buenos Aires, Paidós, 1969, págs 124-142, para considera- [illegible]

a través de la aparición del fenómeno de los barrios de emergencia; sus características son lo suficientemente repetidas como para que se hayan intentado ya algunas conclusiones de tipo general. La vinculación de los barrios de emergencia con las migraciones internas está dada evidentemente porque una gran parte de sus habitantes son migrantes internos; los matices con respecto a este punto son variados, dándose en muchos casos la migración directa desde zonas rurales y la migración escalonada desde zonas rurales a centros urbanos cada vez más grandes.

38. La llegada de los migrantes a las ciudades trae como consecuencia un aumento pronunciado de la desorganización social.

39. Si bien muchos de estos síntomas de desorganización social han sido especialmente estudiados en los barrios de emergencia, hay que tener en cuenta que el asentamiento de inmigrantes dentro de las ciudades se ha hecho también en otro tipo de viviendas como los conventillos o tugurios. Los primeros estudios sobre el tema ofrecieron una visión general del asentamiento urbano de origen migratorio que se basaba en la suposición que por regla general los migrantes se situaban en las ocupaciones y localizaciones geográficas urbanas de más baja condición, mientras la población local nativa se iba ubicando en los peldaños superiores. Este punto de vista se ha puesto en duda por investigaciones posteriores que han presentado un panorama más complejo.

40. En líneas generales los estudios más recientes tienden a demostrar una gran variabilidad en la inserción de los migrantes en las estructuras urbanas[20].

41. La extrema visibilidad de las malas condiciones de vida, ha llevado a la introducción del concepto de marginalidad que en un primer momento se refirió exclusivamente a los migrantes rural-urbanos y a su particular inserción ecológica en los barrios de emergencia frecuentemente situados en las zonas periféricas de la ciudad.

42. Fundamentalmente podemos decir que se han desarrollado dos conceptos de la noción de marginalidad. Uno relativo basado en un estado de integración previo de la población urbana nativa y otro absoluto basado en indicadores objetivos de nivel económico social. Desde el punto de vista relativo, el migrante al llegar a la ciudad se encuentra con una cultura en sentido antropológico ya organizada, en la que por distintas causas económicas, sociales y psicológicas no consigue insertarse. La manifestación de esa falta de inserción es la inestabilidad del trabajo, el subempleo, y en general la escasa participación en los roles previamente existentes en la vida urbana. Se produce entonces una segregación entre dos poblaciones: una más tradicional, ligada a un modo de vida preindustrial que no se adapta a las necesidades del desarrollo industrial; y otra, que si bien está estratificada internamente es funcional y adecuada para el desarrollo industrial. En este caso, el problema fundamental estriba en lograr vencer los obstáculos para permitir la integración o asimilación de los marginados a la vida moderna e industrial.

43. El otro punto de vista simplemente señala la existencia de una parte de la población que a través de distintas dimensiones de la vida social muestra un bajísimo nivel de participación ya sea en el consumo de los bienes de carácter material o de los servicios sociales; ya sea en los mecanismos de decisión social que están en la base de la distribución del poder.

44. La literatura sobre el tema es muy extensa, sin embargo merece una especial consideración el problema de la marginalidad política debido a su especial significación para el caso de las migraciones.

45. Uno de los problemas más serios que enfrenta el migrante es a menudo la falta de medios de expresión para poder hacer sentir sus intereses y necesidades. Este hecho no significa necesariamente, la alteración de una relación vital previa en la que sí existían dichos medios expresivos. Muy a menudo las formas de participación política en los lugares de origen eran inexistentes o muy bajas. Esto sucede especialmente en el caso de las migraciones de tipo rural-urbano.

46. Debemos señalar aquí que esta pérdida de mecanismos de acción política, cuando efectivamente la hay, no es atributo exclusivo de la migración rural-urbana, ni tampoco exclusivamente un fenómeno contemporáneo. Por otra parte, las formas de canalización de las demandas pueden ser de tipo tradicional en los lugares de origen y exclusivas de las clases bajas, lo que no evita el hecho de que existe algún mecanismo para expresar demandas específicas.

47. Se ha subrayado abundantemente la conexión que puede haber entre el desplazamiento migratorio y la falta de estructuras institucionalizadas que capten y comuniquen las demandas en los nuevos lugares de residencia, a la vez que obtengan respuestas adecuadas para las mismas, con la aparición de manifestaciones políticas de protesta violenta o de tipo populista. Dejando de lado las posibles formas de respuesta social a dicha situación, el hecho es que la falta de participación política contribuye grandemente a que todas las otras dimensiones de participación social se encuentren deprimidas[21]. En el caso de la invasión con éxito de

[20] Véase Jorge Balán, "Migrant-native socioeconomic differences in Latin American cities", *loc. cit.*, pág. 4. Del mismo modo, hay diferencias bastante notables entre los tipos de comunidades que se agrupan bajo el nombre de "asentamientos de ocupantes sin título". Véase por ejemplo Douglas Butterworth "Squatters or suburbanites? The growth of shanty-towns in Oaxaca, Mexico", *Latin American Modernization Problems*, compilado por R. E. Scott, University of Illinois Press, 1973, pág. 208.

[21] No debe creerse que la carencia de medios para expresar demandas políticas es solamente característica de los sectores inferiores de la sociedad. Otros miembros de la sociedad pertenecientes a escalones más altos de la pirámide social podrían tener iguales dificultades para dar expresión a sus demandas y obtener respuestas adecuadas a las mismas. Tal fue el caso, por ejemplo, de los empresarios industriales en Argentina en los primeros decenios de este siglo, debido, principalmente, al

(Continúa en la página siguiente)

terrenos urbanos es muy visible el peso determinante que tiene la organización política previa. Esto también se puede apreciar en que muchos barrios de emergencia logran superar los estadios primitivos de gran desorganización social y falta de servicios sociales esenciales.

48. Estas observaciones no significan que hay que dejar de lado otras variables de carácter más general que puedan ayudar a grandes sectores de la sociedad a obtener una posición sensiblemente subordinada en todas las dimensiones de retribución social. Hay una abundante literatura, sobre la repercusión que pueden tener de terminados sistemas económicos sociales, sobre el diferente poder de las distintas naciones en el sistema económico y político internacional, y hasta sobre el desarrollo tecnológico y administrativo actual que impone inevitablemente divisiones jerárquicas del trabajo. Estas publicaciones están plenas de sugestiones, aunque a veces sin llegar a aclarar de qué manera determinadas configuraciones económicas y sociales a nivel nacional e internacional se ligan con características específicas del proceso migratorio y de urbanización[22].

49 Si bien hemos hecho hincapié en los problemas de la llegada de los migrantes a las ciudades, no menos importantes son los que surgen en los lugares de origen Debido a que la selectividad de la migración es positiva, la situación en los lugares de origen de los migrantes tiende a deteriorarse por la pérdida de los individuos más activos. Muchas de estas pequeñas poblaciones se encontraban ya antes de iniciarse el proceso migratorio en un estado muy deprimido, de manera que el proceso no hace más que agravar el estado de cosas preexistente. Lamentablemente sobre este tema es mucho menor el número de estudios realizados a pesar de su enorme importancia[23].

CONCLUSIONES

50. Aunque el proceso migratorio pone de relieve de manera muy visible y enfática las malas condiciones de vida que sufre una proporción substancial de la población, no son las migraciones las causas fundamentales de las mismas, si bien en buena cantidad de casos se ven agravadas por la existencia de desplazamientos de habitantes de un volumen superior al que una racionalidad económico-social aconsejaría

51 La existencia de esa parte marginada de la población, que alcanza porcentajes altísimos en los países de menor desarrollo y que es también bastante considerable en otros que han logrado un ingreso por persona relativamente aceptable, constituye una flagrante transgresión a algunos de los derechos fundamentales anunciados por las Naciones Unidas.

52 De hecho todos los Artículos del 22 al 27 de la Declaración Universal de Derechos Humanos se refieren al derecho que posee toda persona de participar de los bienes sociales y económicos que la sociedad produce Otras resoluciones de las Naciones Unidas apuntan en la misma dirección, estableciendo solemnemente el derecho inalienable de todos a gozar de los beneficios económicos, sociales y culturales que son patrimonio de la sociedad Por otra parte, se subraya en estas declaraciones que no es posible alcanzar los ideales de libertad y de ausencia de temor y necesidad si no se logran paralelamente los avances necesarios en el grado de bienestar económico y social de la población

53 De manera que también es una violación flagrante de los derechos humanos fundamentales la

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hecho de que eran inmigrantes (en este caso, externos) Véase Oscar Cornblit, "European immigrants in Argentine industry and politics", *The Politics of Conformity in Latin America*, compilado por Claudio Veliz, Londres, Oxford University Press, 1967, pág 221. Sobre la cuestión general de la relación de la maquinaria política con los inmigrantes, véase también David Rock, "Machine politics in Buenos Aires and Argentine radical party, 1912-1930" *Journal of Latin American Studies*, vol 4, parte 2 (noviembre 1972), págs. 233-256 Es también muy importante señalar que en algunos casos la participación política puede ser muy grande y estar estructurada mediante los conductos establecidos o al menos mediante conductos semejantes a los existentes Esto parece depender en gran medida de la densidad de vida comunal que lleve el individuo Llama la atención, por ejemplo, cuánto mayor fue la participación política de los colonos de las colonias agrícolas de la provincia de Santa Fe en la Argentina hacia fines del siglo diecinueve, debido a que tenían un tipo de vida comunal muy intenso comparado con el de los agricultores de origen extranjero de la provincia de Buenos Aires en el mismo período que se establecieron de un modo mucho más disperso Véase Ezequiel Gallo, "Santa Fe 1893: La revolución radical y las [illegible]

[illegible] Aires, [illegible]

[22] Sobre este punto véase Torcuato S Di Tella, "La división del trabajo y el concepto marxista de clase social", *Revista latinoamericana de sociología* (de próxima publicación).

[23] La migración de lugares rurales puede considerarse también como un modo de encauzar fuerzas potencialmente explosivas que de otro modo podrían haber constituido una base política para alguna forma de cambio radical de la estructura local Esta posición la sostiene, por ejemplo, Mario Margulis en *Migración y marginalidad en la sociedad argentina*, *op cit*, pág 135 Rivarola expresa una opinión semejante para la migración paraguaya, aunque en este caso, los principales lugares de destino de los migrantes están fuera del país (Brasil y Argentina), no habiendo casi cambio en las propor- [illegible]

[illegible] *guaya de sociología* Año [illegible], No 24 (mayo-agosto [illegible]), págs 73-122, y Ramón B Fogel, "Determinantes negativos de la movilización social en sistemas sociales rurales del Paraguay", *Idem*, págs 149-162 Stavenhagen considera el caso de las migraciones estacionales e indica que éste es uno de los factores que permite mantener una estructura tradicional de poder Véase Rodolfo Stavenhagen, "Marginalidad, participación y estructura agraria en América Latina", *Demografía y economía*, vol IV, No 3(12) (1970), pág 281 Por otro lado, Martínez considera que las migraciones tienden a acelerar el ritmo del cambio social en las comunidades de origen, no sólo desde el punto de vista de las innovaciones sino también creando las condiciones para su desintegración. Véase Martínez, Héctor, *loc cit*, pág 159

a través de la aparición del fenómeno de los barrios de emergencia; sus características son lo suficientemente repetidas como para que se hayan intentado ya algunas conclusiones de tipo general. La vinculación de los barrios de emergencia con las migraciones internas está dada evidentemente porque una gran parte de sus habitantes son migrantes internos; los matices con respecto a este punto son variados, dándose en muchos casos la migración directa desde zonas rurales y la migración escalonada desde zonas rurales a centros urbanos cada vez más grandes.

38. La llegada de los migrantes a las ciudades trae como consecuencia un aumento pronunciado de la desorganización social.

39. Si bien muchos de estos síntomas de desorganización social han sido especialmente estudiados en los barrios de emergencia, hay que tener en cuenta que el asentamiento de inmigrantes dentro de las ciudades se ha hecho también en otro tipo de viviendas como los conventillos o tugurios. Los primeros estudios sobre el tema ofrecieron una visión general del asentamiento urbano de origen migratorio que se basaba en la suposición que por regla general los migrantes se situaban en las ocupaciones y localizaciones geográficas urbanas de más baja condición, mientras la población local nativa se iba ubicando en los peldaños superiores. Este punto de vista se ha puesto en duda por investigaciones posteriores que han presentado un panorama más complejo.

40. En líneas generales los estudios más recientes tienden a demostrar una gran variabilidad en la inserción de los migrantes en las estructuras urbanas[20].

41. La extrema visibilidad de las malas condiciones de vida, ha llevado a la introducción del concepto de marginalidad que en un primer momento se refirió exclusivamente a los migrantes rural-urbanos y a su particular inserción ecológica en los barrios de emergencia frecuentemente situados en las zonas periféricas de la ciudad.

42. Fundamentalmente podemos decir que se han desarrollado dos conceptos de la noción de marginalidad. Uno relativo basado en un estado de integración previo de la población urbana nativa y otro absoluto basado en indicadores objetivos de nivel económico social. Desde el punto de vista relativo, el migrante al llegar a la ciudad se encuentra con una cultura en sentido antropológico ya organizada, en la que por distintas causas económicas, sociales y psicológicas no consigue insertarse. La manifestación de esa falta de inserción es la inestabilidad del trabajo, el subempleo, y en general la escasa participación en los roles previamente existentes en la vida urbana. Se produce entonces una segregación entre dos poblaciones: una más tradicional, ligada a un modo de vida preindustrial que no se adapta a las necesidades del desarrollo industrial; y otra, que si bien está estratificada internamente es funcional y adecuada para el desarrollo industrial. En este caso, el problema fundamental estriba en lograr vencer los obstáculos para permitir la integración o asimilación de los marginados a la vida moderna e industrial.

43. El otro punto de vista simplemente señala la existencia de una parte de la población que a través de distintas dimensiones de la vida social muestra un bajísimo nivel de participación ya sea en el consumo de los bienes de carácter material o de los servicios sociales; ya sea en los mecanismos de decisión social que están en la base de la distribución del poder.

44. La literatura sobre el tema es muy extensa, sin embargo merece una especial consideración el problema de la marginalidad política debido a su especial significación para el caso de las migraciones.

45. Uno de los problemas más serios que enfrenta el migrante es a menudo la falta de medios de expresión para poder hacer sentir sus intereses y necesidades. Este hecho no significa necesariamente, la alteración de una relación vital previa en la que sí existían dichos medios expresivos. Muy a menudo las formas de participación política en los lugares de origen eran inexistentes o muy bajas. Esto sucede especialmente en el caso de las migraciones de tipo rural-urbano.

46. Debemos señalar aquí que esta pérdida de mecanismos de acción política, cuando efectivamente la hay, no es atributo exclusivo de la migración rural-urbana, ni tampoco exclusivamente un fenómeno contemporáneo. Por otra parte, las formas de canalización de las demandas pueden ser de tipo tradicional en los lugares de origen y exclusivas de las clases bajas, lo que no evita el hecho de que existe algún mecanismo para expresar demandas específicas.

47. Se ha subrayado abundantemente la conexión que puede haber entre el desplazamiento migratorio y la falta de estructuras institucionalizadas que capten y comuniquen las demandas en los nuevos lugares de residencia, a la vez que obtengan respuestas adecuadas para las mismas, con la aparición de manifestaciones políticas de protesta violenta o de tipo populista. Dejando de lado las posibles formas de respuesta social a dicha situación, el hecho es que la falta de participación política contribuye grandemente a que todas las otras dimensiones de participación social se encuentren deprimidas[21]. En el caso de la invasión con éxito de

[20] Véase Jorge Balán, "Migrant-native socioeconomic differences in Latin American cities", *loc. cit.*, pág. 4. Del mismo modo, hay diferencias bastante notables entre los tipos de comunidades que se agrupan bajo el nombre de "asentamientos de ocupantes sin título". Véase por ejemplo Douglas Butterworth "Squatters or suburbanites? The growth of shanty-towns in Oaxaca, Mexico", *Latin American Modernization Problems*, compilado por R. E. Scott, University of Illinois Press, 1973, pág. 208.

[21] No debe creerse que la carencia de medios para expresar demandas políticas es solamente característica de los sectores inferiores de la sociedad. Otros miembros de la sociedad pertenecientes a escalones más altos de la pirámide social podrían tener iguales dificultades para dar expresión a sus demandas y obtener respuestas adecuadas a las mismas. Tal fue el caso, por ejemplo, de los empresarios industriales en Argentina en los primeros decenios de este siglo, debido, principalmente, al

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terrenos urbanos es muy visible el peso determinante que tiene la organización política previa. Esto también se puede apreciar en que muchos barrios de emergencia logran superar los estadios primitivos de gran desorganización social y falta de servicios sociales esenciales.

48. Estas observaciones no significan que hay que dejar de lado otras variables de carácter más general que puedan ayudar a grandes sectores de la sociedad a obtener una posición sensiblemente subordinada en todas las dimensiones de retribución social. Hay una abundante literatura, sobre la repercusión que pueden tener de terminados sistemas económicos sociales, sobre el diferente poder de las distintas naciones en el sistema económico y político internacional, y hasta sobre el desarrollo tecnológico y administrativo actual que impone inevitablemente divisiones jerárquicas del trabajo Estas publicaciones están plenas de sugestiones, aunque a veces sin llegar a aclarar de qué manera determinadas configuraciones económicas y sociales a nivel nacional e internacional se ligan con características específicas del proceso migratorio y de urbanización[22].

49. Si bien hemos hecho hincapié en los problemas de la llegada de los migrantes a las ciudades, no menos [illegible]

grantes tiende a deteriorarse por la pérdida de los individuos más activos Muchas de estas pequeñas poblaciones se encontraban ya antes de iniciarse el proceso migratorio en un estado muy deprimido, de manera que el proceso no hace más que agravar el estado de cosas preexistente. Lamentablemente sobre este tema es mucho menor el número de estudios realizados a pesar de su enorme importancia[23].

Conclusiones

50 Aunque el proceso migratorio pone de relieve de manera muy visible y enfática las malas condiciones de vida que sufre una proporción substancial de la población, no son las migraciones las causas fundamentales de las mismas, si bien en buena cantidad de casos se ven agravadas por la existencia de desplazamientos de habitantes de un volumen superior al que una racionalidad económico-social aconsejaría.

51. La existencia de esa parte marginada de la población, que alcanza porcentajes altísimos en los países de menor desarrollo y que es también bastante considerable en otros que han logrado un ingreso por persona relativamente aceptable, constituye una flagrante transgresión a algunos de los derechos fundamentales anunciados por las Naciones Unidas

52. De hecho todos los Artículos del 22 al 27 de la Declaración Universal de Derechos Humanos se refieren al derecho que posee toda persona de participar de los bienes sociales y económicos que la sociedad produce. Otras resoluciones de las Naciones Unidas apuntan en la misma dirección, estableciendo solemnemente el derecho inalienable de todos a gozar de los beneficios económicos, sociales y culturales que son patrimonio de la sociedad Por otra parte, se subraya en estas declaraciones que no es posible alcanzar los ideales de libertad y de ausencia de temor y necesidad si no se logran paralelamente los avances necesarios en el grado de bienestar económico y social de la población

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hecho de que eran inmigrantes (en este caso, externos). Véase Oscar Cornblit, "European immigrants in Argentine industry and politics", *The Politics of Conformity in Latin America*, compilado por Claudio Veliz, Londres, Oxford University [illegible]

política puede ser muy grande y estar estructurada mediante los conductos establecidos o al menos mediante conductos semejantes a los existentes Esto parece depender en gran medida de la densidad de vida comunal que lleve el individuo Llama la atención, por ejemplo, cuánto mayor fue la participación política de los colonos de las colonias agrícolas de la provincia de Santa Fe en la Argentina hacia fines del siglo diecinueve, debido a que tenían un tipo de vida comunal muy [illegible]

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existencia de individuos que viven bajo condiciones de vida infrahumanas en cualquier dimensión de la vida y de la cultura que pueda configurar una personalidad humana de acuerdo con las concepciones actuales del hombre integrado y capaz de desarrollar plenamente sus facultades.

54. Ahora bien, es esencial que todos los principios fundamentales que constituyen el conjunto de derechos humanos sean compatibles entre sí.

55. Si la aplicación de un principio pone en peligro la prática de otros debe encontrarse una solución armónica y racional, que respete básicamente los principios establecidos.

56. Hacer compatibles los principios no significa suprimir algunos en beneficio de otros.

57. Para el caso que estamos considerando podría argüirse que el exceso de migraciones internas está por encima de lo que aconseje una racionalidad económica que intente mejorar el nivel de producción y distribución en cuanto a una asignación espacial adecuada de los factores de producción, y por lo tanto justifica la imposición de trabas al libre desplazamiento de las personas dentro del territorio de un país. Pero debe tenerse presente enfáticamente que la introducción de tales trabas constituye también una flagrante violación al derecho fundamental que tienen todas las personas de elegir libremente el lugar de su residencia[24].

58. Debemos tener en cuenta que existe una gran variedad de métodos para orientar las migraciones y mejorar las condiciones de vida en las grandes aglomeraciones urbanas, sin transgredir para nada los derechos humanos fundamentales.

59. En este sentido es importante señalar que lo principal aquí es la decisión de no infringir los derechos fundamentales. Una vez aceptado este principio previo, la investigación y la experimentación pueden encontrar soluciones, si es que el repertorio de instrumentos sociales disponibles o conocidos no alcanza para responder a las exigencias de acción planteadas por las necesidades básicas insatisfechas de las poblaciones.

60. Por supuesto resulta aparentemente más sencillo suprimir la libertad de movimiento que buscar soluciones más sofisticadas a los problemas de la migración inadecuadamente orientada. Las soluciones sofisticadas son más costosas, requieren la experimentación continua y también implican riesgos de equivocación. Pero si bien a corto plazo pueden ser consideradas como más costosas e ineficientes con respecto a los objetivos inmediatos buscados, a más largo plazo son provechosas con respecto al progreso de los individuos como seres humanos. Aun desde el punto de vista de un cálculo económico estricto, a largo plazo todas las medidas que estimulen la capacidad de decisión individual basadas en un desarrollo más completo de la personalidad, favorecen la formación de recursos humanos calificados, flexibles y capaces de generar la iniciativa individual y la creatividad que la moderna tecnología productiva exige. Toda traba legal contra el libre desplazamiento de las personas disuade la capacidad de libre decisión y por tanto conspira directamente contra la estructuración de las bases humanas necesarias para la producción de la civilización actual.

61. Los instrumentos sociales útiles para enfrentar los problemas vinculados con las migraciones pueden ser básicamente de dos tipos: uno está representado por los instrumentos que provee el Estado directamente y el otro por aquellos que surgen fundamentalmente a través de la iniciativa propia de los individuos, que pueden también recibir apoyo indirecto del Estado.

62. El repertorio de medidas posibles al alcance del estado toca fundamentalmente dos aspectos: la situación de los migrantes en los lugares de llegada y las motivaciones que los hacen abandonar los lugares de origen.

63. Respecto a los lugares de origen hay que tener en cuenta que los habitantes de zonas rurales o poblaciones pequeñas están mucho más marginados que los que se encuentran en los puntos más bajos de la pirámide social en los conglomerados urbanos grandes. Todas las medidas que estimulen el mejoramiento de las condiciones de empleo en las zonas rurales o semirrurales son importantes, ya sea a través del establecimiento de nuevas industrias o a través de la revalorización de actividades de tipo tradicional, fundamentalmente las artesanías, que tienen una demanda creciente en las zonas urbanas más sofisticadas. Programas especiales para el mejoramiento de la vivienda rural o semirrural y de los servicios sociales y médicos son instrumentos fundamentales.

64. Pero el ámbito de las medidas gubernamentales no debiera restringirse solamente a las dimensiones materiales de la vida. La emigración de la gente joven está conectada frecuentemente con la falta de posibilidades de educación, de cultura y de recreación adecuadas.

65. En esta dirección deben contabilizarse la creación y apoyo de instituciones de educación y cultura tales como escuelas técnicas, universidades, escuelas secundarias y las iniciativas individuales que favorecen actividades culturales como la música, las artes plásticas, el teatro, las artesanías y los deportes. Estas medidas no sólo sirven para retener a los jóvenes en sus lugares de origen, sino también para atraer a otros de centros urbanos más grandes y favorecer así las posibilidades de la migración de retorno. Programas especiales para apoyar estas actividades en las poblaciones más pequeñas, deberían ser diseñados.

[24] Durante el período fascista en Italia se promulgó, en 1939, una ley que exigía "permisos de tránsito para la protección de las ciudades". Esta ley fue derogada hace pocos años por una decisión del Tribunal Constitucional de Italia. Véase G. Fofi, "Immigrants to Turin", *Readings in the Sociology of Migration*, compilado por C. J. Janser, Oxford, Pergamon Press, 1966, pág. 276.

66. En general es importante planear el desarrollo de centros y subcentros regionales que en forma de red interconectada satisfaga las distintas dimensiones de la vida contemporánea que la población demanda.

67. Aquí el estado debe actuar para compensar las desigualdades regionales que se producen debido a los factores que automáticamente refuerzas la primacía de algunos centros urbanos. Esto significará la elaboración de un sistema de compensaciones regionales adecuadamente diseñado. Debe señalarse que un diseño adecuado debe tener en cuenta también las posibilidades reales de transferencias regionales de ingresos, ya que éstas despertarán inevitablemente fricciones políticas que pueden adquirir magnitudes considerables de expresión.

68. Dadas las críticas actuales contra las condiciones insalubres de la vida urbana y la contaminación creciente del medio ambiente de las grandes concentraciones humanas, debiera ser relativamente fácil realzar las cualidades de la vida en las zonas rurales Es cierto que esto no remediará la migración motivada por razones económicas o de trabajo, pero añadirá un elemento importante al contexto de otros tipos de migraciones. En este sentido, y referido a la cuestión de las migraciones basadas en la escasez de oportunidades económicas, es importante subrayar la especial significancia negativa que tienen en zonas rurales los sistemas de tenencia de la tierra de gran concentración La combinación de las medidas anteriores con programas que estimulen la división de la tierra contribuirán a un mayor afincamiento de la población fuera de los grandes conglomerados urbanos

69. Es muy importante hacer resaltar que el apoyo a las iniciativas locales debiera ser prioritario Muchas veces, programas locales que no parecen ser viables en términos estrictamente económicos carecen de apoyo por esas razones Pero la experiencia demuestra que cuando la gente está primordialmente motivada por algún objetivo está dispuesta a compensar con esfuerzos extras lo que podría ser considerado como una asignación irracional de la mano de obra. Tales son por ejemplo, los programas de vivienda que se basan en el esfuerzo propio de los futuros ocupantes de las mismas. Muchas veces estos esfuerzos se canalizan a través de compañías de ventas de lotes de terrenos, las que por carecer de un plan mínimo de organización urbana contribuyen a mediano plazo al empeoramiento de las condiciones de vida de la población Pero la capacidad de las poblaciones de construir sus propias habitaciones demuestra que con un mínimo de posibilidades los individuos están muy dispuestos a hacer los esfuerzos necesarios para obtener las mínimas condiciones de habitación digna

70. Una vez poseedores de una pequeña superficie de tierra, por medio de presiones sobre las autoridades locales, los individuos logran obtener algunos servicios como luz, agua y electricidad al mismo tiempo que construyen sus propias casas, si bien es cierto que a un ritmo lento y no siempre con la habilidad necesaria. Combinando este interés individual con medidas prácticas de apoyo mucho podría adelantarse en esa dirección.

71. Sin embargo la experiencia en cuanto a declaraciones de derecho en este sentido ha sido poco halagueña. Debería ser mucho más importante que la declaración de nuevos derechos, la búsqueda de mecanismos prácticos para la implementación de los mismos. Incorporar nuevas declaraciones especiales que se refieran a situaciones particulares no parece una herramienta efectiva para la obtención de resultados concordantes con dichas declaraciones.

72. Una segunda línea de ataque descansa en las iniciativas privadas individuales o colectivas, que proveen la base de una presión permanente sobre las autoridades para que éstas produzcan medidas de gobierno que otorguen a los sectores relegados.

73. Sería aconsejable organizar secciones especiales dentro del aparato del estado capaces de proveer respuestas adecuadas a las iniciativas locales, que de otra manera se perderían dentro de las complejidades de las administraciones burocráticas

74 Todo el conjunto de medidas que estamos proponiendo apunta a otorgar a los conglomerados urbanos que no forman parte de las grandes concentraciones metropolitanas, atractivos semejantes a los que ofrecen éstas últimas Muchas investigaciones sobre las migraciones señalan que contabilizando los pros y los contras de la situación de los migrantes que han abandonado sus poblaciones de origen y se encuentran en condiciones de vida muy precarias y marginadas en los puntos de llegada, el resultado es indudablemente favorable al desplazamiento y justifica la migración efectuada Este hecho por otra parte coincide con la opinión de los migrantes mismos a través de las encuestas La mayor parte de ellos no están arrepentidos de haber abandonado su lugar de nacimiento

75 Estas consideraciones podrían traducirse eventualmente en un conjunto de declaraciones sobre derechos humanos correspondiente a los individuos que habitan zonas rurales o poblaciones pequeñas Aun cuando implícitamente las declaraciones sobre derechos humanos se refieren a todos los habitantes de un país, la especificación de los mismos por zonas rurales o semirrurales permitiría alertar más claramente a los gobiernos sobre las dificultades particulares de estas zonas

76 Todas las iniciativas cuando están destinadas a producir medidas de gobierno tienen un carácter político, aun cuando su cometido fundamental no lo sea

77 Tal es el caso por ejemplo de las asociaciones de habitantes de barrios de emergencia cuya preocupación principal es obtener viviendas adecuadas Expertos dedicados al estudio de estos barrios coinciden en señalar el alto grado de iniciativa política que sus habitantes demuestran toda vez que avizoran una mínima posibilidad de éxito en la consecución de sus fines.

78. Es cierto que una vez conseguido el objetivo más claro, como es por ejemplo la ocupación de un predio o la construcción de una casa, el interés decae y la participación en actividades destinadas a mejorar otras dimensiones de la vida cotidiana se vuelve mucho más débil. Pero este hecho podría compensarse con una información adecuada sobre la importancia que pueden tener otras dimensiones de la vida social tales como la atención médica, la educación, los servicios sanitarios, la recreación dominical, la cultura, etc. En esto pueden jugar un papel importante los individuos con capacidad de dirigir que provienen de los propios lugares de residencia. El estado podría ayudar a estas iniciativas dentro de ciertos requisitos mínimos de viabilidad y seriedad.

79. No debe pensarse que tales objetivos son de fácil realización. Hay que luchar contra muchos obstáculos, entre ellos la oposición de líderes al surgimiento de fuentes de poder competitivas. Sin embargo, pueden obtenerse progresos razonables si estas dificultades son previstas de antemano, si se cuentan con mecanismos de negociación adecuados y con el apoyo de líderes de nivel más alto que pueden hacer valer sus recursos de prestigio y de poder. Los partidos políticos deberían también contar con información adecuada sobre estos temas y estimular la atención especial que requieren los problemas de las poblaciones migrantes, para que estos problemas no se diluyan dentro de la organización general ni de los mecanismos de canalización de demandas de la población.

80. En conclusión, los mecanismos autónomos de acción política deberían ser estimulados y alentados, dado que a la larga son la mejor garantía de que las demandas e intereses sentidos genuinamente por la población serán tenidos en cuenta. Las asociaciones voluntarias son los instrumentos más aptos para el logro de estas metas.

81. Pero es necesario continuar investigando estos procesos y su conexión con la política de los gobiernos. Esto establecerá una base empírica más sólida que facilitará el diseño de proyectos para la solución de los problemas.

POPULATION AND INTERNATIONAL MIGRATION: THE CASE OF THE MIGRANT WORKERS *

Prepared by Yash P. Ghai **

1. The basic purpose of this paper is to explore the conditions of migrant workers in the context of the generally accepted principles and provisions of human rights The focus is on migrant workers in Africa and Western Europe These introductory remarks seek to place the case of the migrant workers in the context of the Symposium.

2 Traditionally, migration has been viewed as both a response to and a solution of population pressures.[1] Such an approach has been relevant to the experience of European States, whose surplus populations have sought new opportunities in the Americas, Oceania and parts of colonial empires. It is estimated that between 1800 and 1930, 40 million Europeans migrated overseas.[2] There have also been very considerable movements out of Asia, and large numbers of people have migrated from India, for example, not only to neighbouring countries, but to the far corners of the globe.[3] In more recent times, there have been significant migrations to Western Europe It is doubtful whether migration across national boundaries has the potential today to alleviate population pressures to any significant extent.[4] About the turn of the century, most developed countries introduced immigration restrictions, and it is unlikely that these restrictions will be relaxed to allow the admission of the poor and the unskilled from the poorer parts of the world in other than small numbers Countries of Africa and Asia have also begun to introduce restrictions and, indeed, to provide for the expulsion of non-citizen residents [5]

3. The view that regards migration as a response to population pressures (at least with respect to the experience of the past 100 years) proceeds on the assumption of its voluntary nature. In fact, much of the so-called "voluntary migration" has taken place under the impact of economic forces over which the migrants themselves have had no control and which have clearly been manipulated by the organizers and recipients of migrants. To begin to question the validity of this claim, one has only to look at the colonial policies of labour recruitment, combining fiscal and more overt pressures,[6] amounting in numerous instances to compulsion It may be argued that such policies are no longer operative, and that the Conventions of the International Labour Organisation (ILO)[7] have put a stop to them. While such policies may have disappeared in their overt form, it is clear that the reality behind compulsion has not Labour and recruitment practices, not only in South Africa, but elsewhere, including Europe, are determined very largely by the needs of capitalism, with its limited but all-pervasive object of profit All the migrations discussed in this paper are, in a real sense, regulated by the forces of market capitalism, which looks at labour as merely another factor in production

4. Also pertinent to the connexion between migration and human rights is the recognition that economic and social development is an essential preliminary to the universal safeguarding of human dignity. It is, therefore, necessary to undertake a very critical evaluation of the cost and benefits of migration with respect to the countries which lose their labour. It is generally stated that the benefits are mutual, but the African experience, at least, shows that this is far from the case, and migration and recruitment practices have, by

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[illegible] capacity of the economy to absorb labour and to provide decent levels of living The causes of the inability of an economy to absorb labour are complex, although it would appear to be incorrect to regard the size of the population itself as a cause

[2] Robert Descloitres, *The Foreign Worker Adaptation to Industrial Work and Urban Life* (Paris, Organisation for Economic Cooperation and Development, 1967), p. 22 Willcox puts the figure even higher, as being in the region of 55.5 million in the period 1820-1924, *op cit*, p 82

[3] In 1921, for example, nearly 3 million Indians were resident overseas See Shivras in Willcox, *op cit.*, p. 592.

[4] Gunnar Myrdal, *Asian Drama An Inquiry into the Poverty of Nations* (New York, Pantheon Books, 1968), vol II, pp 1459-1462

[5] In recent years, Indians have been expelled from Burma and Sri Lanka For expulsions from Africa, see International Labour Organisation, *Employment, Status and Conditions of Non-National Workers in Africa* (Geneva, 1973); Tandon, "The Asians in East Africa in 1972", in Colin Legum and [illegible]

siphoning the able bodied men of a community, had disastrous consequences on the community and have, in a real sense, caused the underdevelopment of those communities.[8] Not only has their life-style been disrupted, but their capacity for autonomous development has been perhaps irreversibly destroyed. It is quite probable that in a less dramatic but equally chronic manner, the current migrations are doing irreparable damage to the emigrating countries or regions.[9] If so, this is a great set-back to the cause of human rights, for the poorer developing countries or regions are less and less likely to achieve conditions of sustained growth in their own countries, which are a prerequisite of a victory for human rights and freedoms. There is an urgent need for studies of the impact of migrations on the poorer developing countries (from which the bulk of the migrants come)—an impact conceived in broad and long-range terms.

MIGRANTS AND HUMAN RIGHTS: THE PROBLEM

5. It is, nevertheless, clear that, for a variety of reasons, some international transfers of populations will continue in the foreseeable future. One of the most important instances of such transfers today are the migrant workers. It is estimated that there are 11 million migrant workers in Western Europe, some of whom come from within Europe, but the majority of whom come from Africa, Asia and the Caribbean.[10] They constitute over 5 per cent of the population of Western Europe (in Switzerland, as high as 16 per cent) and an even an higher percentage of the working population —as much as 30 per cent in Switzerland. In Africa, it is estimated that there are over 2 million migrants, and they constitute a high proportion of wage workers, perhaps 15 per cent or more, in Ghana and the Ivory Coast.[11] A great deal of migration takes place between the countries of Latin America, the total number of migrants being about 2 million.[12]

6. The conditions in which migrant workers find themselves give serious cause for concern. The growing realization of the plight of the migrant workers is evident from the recent concern expressed both by the United Nations and by the ILO. The phenomenon of migrant workers poses serious threats to the maintenance of human rights which have been achieved in various countries and makes their realization more difficult in others. The plight of migrant workers raises the spectre of servitude, and the total and overwhelming insecurity in which many of them live erases any possibility of a situation where human dignity can be attained. Because of limitations of space, it is not possible here to give a detailed enumeration of the rights that are threatened. Occasional newspaper reports have highlighted the appalling conditions under which migrant workers are transported, especially, but not always, when they attempt an illegal or clandestine entry into a country. A recent headline referred to the practice as "a latter-day slave trade",[13] for it is not only the conditions of transport (which not infrequently cause death) that are appalling, but the fact that the transporters pocket most of the future earnings of the migrants, in addition to the exorbitant transportation charges.[14] Once in the countries of employment, migrants lead a life which is often miserable. They suffer discrimination in almost all aspects of life. They work at the most unpleasant jobs and are among the lowest paid. They have little security of employment; and, in many cases, they feel haunted (not without justification) by the web of the law of work permits and work and residence restrictions. They are often separated from their families because of legal or other restrictions,[15] and their housing conditions are by far the worst. There are serious restrictions on their right to participate in trade union activities, and in most countries they cannot hold office. Where a right exists *de jure*, it is nullified in practice, because the activist migrants are victimized by the police or employers, and are often expelled. Their rights to social security are limited, again if not in law then in practice.[16] In some countries, especially in Africa, there have been mass expulsions of migrant residents—often of long standing—in conditions of very great hardship. In Europe, the first workers to be dismissed in periods of recession are migrants. They live in a state of fear and anxiety, are vulnerable to exploitation because of their ignorance and weak bargaining position, and are afraid to invoke such law as exists for their protection.

7. It is important to view this situation not only as the denial of specific rights, but as a process. "The whole process of labour migration is now manifesting

[8] See W. Rodney, *How Europe Underdeveloped Africa* (Washington, D.C., Howard University Press, 1972).

[9] Paalo Cinanni, "The backgrounds of migration labour", in H. van Houte and W. Melgert, *Foreigners in our Community* (Amsterdam, Kiesing, 1972), pp. 27-36; Wallman, "Conditions of non-development: the case of Lesotho", *Journal of Development Studies* (United Kingdom), vol. VIII (1971); S. Castles and G. Kosak, *Immigrant Workers and Class Structure in Western Europe* (London, Oxford University Press, 1973), pp. 1-8.

[10] International Labour Organisation, *Migrant Workers* (1973), p. 6; see S. Castles and G. Kosak, *op. cit.*, for numerous statistics on migration to Western Europe and for a penetrating study of migrant workers.

[11] International Labour Organisation, *Employment, Status and Conditions of Non-National Workers in Africa.*

[12] International Labour Organisation, *Migrant Workers*, p. 6.

[13] *The Economist*, 24-30 November 1973, p. 41.

[14] Smugglers are not the only group promoting servitude. Castles and Kosak mention that, when expanding efficient firms in Switzerland are unable to hire enough foreign workers owing to restrictive measures of the Government, less efficient firms, with less work on hand, hire out surplus foreign workers to the more efficient firms. The higher wages paid by the more efficient firms are not paid to the workers, but are paid to their former employers, who continue to pay low wages. The authors allege that the practice also exists in the Federal Republic of Germany, S. Castles and G. Kosak, *op. cit.*, p. 161, foot-note.

[15] A survey among Turkish workers showed that 93 per cent were married and 85 per cent had to leave their families in their home countries. J. Tinbergen, in H. van Houte and W. Melgert, *op. cit.*, p. 17.

[16] For a detailed study of these questions in Europe, see S. Castles and G. Kosak, *op. cit.*

the characteristics of the Industrial Revolution: bad housing, ghettoes, the prohibition of strikes, insufficient education facilities, intimidation and vague legal protection".[17] In the industrial countries, one of the great forces which fought for the amelioration of the conditions of workers was the trade union movement. It is highly problematical whether that movement would play a similar role in the amelioration of the conditions of the migrant workers. There is some reason to believe that migration may weaken the trade union movement, as the national workers may perceive their interests as different from (when not actually opposed to) those of the migrants. Everywhere, the migrants are paid less than the local population and work under conditions that are much worse. They do jobs that the local people are not prepared to do. There is clear and systematic exploitation. The local workers have experienced an upward mobility which would not have been possible in the absence of migrants and often hold positions superior to those held by migrants, although they have fewer skills. This trend is said to be most pronounced in Switzerland, where a student of the situation has said:

> "In the end, in fact, as some people fear, the Swiss could become a race of supervisors having at their service a labour force without political rights, dedicated to the least agreeable tasks, and victims of a more or less total segregation, which would be equivalent to a colonial state, with the difference that the autochthonous people would be the masters and the immigrants the servants "[18]

INTERNATIONAL STANDARDS

8 International standards are established mainly through the United Nations Declaration of Human Rights and the two Covenants on Human Rights, Conventions and Recommendations of the ILO, and certain regional declarations and treaties.[19] The right to leave any country, including one's own, is set forth both in the Universal Declaration of Human Rights and in the Covenant on Civil and Political Rights. No declaration projects a general right of immigration, although article 12 (4) of the Covenant would cover situations similar to those of the East African British subjects of Asian origin, whose entry into the United Kingdom of Great Britain and Northern Ireland has been restricted, presumably in contravention of the standards laid down in the Covenant. The same Covenant seeks to regulate the expulsion of aliens and to prescribe certain minimum standards of procedure. The declarations are much more specific on the rights of those who have migrated The general thrust of the provisions is that there shall be complete equality between the national and the migrant workers, at least in so far as economic rights (remuneration, social security, trade union rules etc.) and certain social rights are concerned, although developing countries may determine to what extent they would wish to guarantee the economic rights to non-nationals.[20] The principle of non-discrimination underlies several other United Nations declarations [21] These declarations are not primarily concerned with migrant workers, but the migrant workers are covered by their provisions.[22] Some instruments seek to remove the worst forms of exploitation, which in the past has often been associated with migrant labour. Thus, slavery and similar institutions,[23] forced labour,[24] traffic in persons,[25] and illicit and clandestine trafficking in migrant labour[26] have either been expressly outlawed or strongly condemned The standards established through the ILO and regional organizations are elaborated below

THE RÉGIME OF PROTECTION OF MIGRANT WORKERS

9. Various techniques have been employed for the regulation of migration and for the protection of migrant workers. There exist, first of all, traditional and general rules of international law These have been evolving over the years, depending to some extent upon the needs of international commerce or imperialism With reference to migration, it would be true to say that under general international law, there is no right of immigration into another country.[27] If that country is the one to which the migrant belongs through the bonds of nationality, the weight of opinion is that there is a right to enter [28] There is a similar ambiguity about the right to leave a country. While the power of a State to prevent a person from leaving that State, except in limited instances to ensure the enforcement of his legal obligations and liabilities, is denied, the matter is different if the person is a national of the State. A number of countries have imposed restrictions on the right of their nationals to leave, and it would be correct to say that the preponderance of opinion is that the matter is one of domestic juris-

[17] H van Houte and W. Melgert, *op cit.*

[18] Girod, quoted in S Castles and G Kosak, *op cit*, p 383

[19] The United Nations instruments are not discussed in detail, nor are all the relevant legal issues, as these matters are [illegible]

[20] Covenant on Economic, Social and Cultural Rights, art 3 (3).

[21] The Declaration (1963), as well as the Convention on the Elimination of All Forms of Racial Discrimination (1965) and Discrimination (Employment and Occupation) Convention (1958)

[22] The last-mentioned Convention does not apply to migrant workers as such

[23] Slavery Convention (1926); Supplementary Convention (1956)

[illegible]

[27] See Richard Plender, *International Migration Law*, Law and Population Series, No. 2 (Leiden, A. W. Sijthoff, 1972).

[28] Recent legislation and judicial decisions in the United Kingdom have repudiated or restricted this right in relation that country.

diction.[29] As for the protection of the migrant, there is surprisingly little law. Much of the subject has been concerned with the protection of the property of aliens and their access to the legal system of the country of residence. Thus, there is very considerable literature on the law of nationalization and on the concept of denial of justice and the exhaustion of local remedies, but not much on the migrant who is an employee. Some rudimentary rules of limitation on expulsion would cover such a person, but their purport and extent are far from clear.

10. The United Nations declarations and covenants seek to remove these ambiguities and to strengthen traditional rights of the individuals, or to establish new ones when necessary. These instruments are not, however, strictly speaking, legally binding (although the latter will become so when there are enough ratifications). The cause of the migrant workers has been most advanced by specific Conventions of the ILO. The ILO has a long history of involvement in the problems of migrant labour, and one of its first activities was a recommendation (in 1919) urging member States to treat foreign workers on a parity with national workers, on the basis of reciprocity.[30] It has adopted a number of conventions and passed several recommendations which promote the rights of the migrant workers. At first, the ILO tended to treat the problems of migrant workers in Europe differently from those in the developing countries. Although it now adopts a global approach, there still exist its Conventions and Recommendations, which apply exclusively to some developing regions. It is therefore necessary to look both at the Conventions that apply generally and at those that apply or applied in relation to formerly dependent territories, and which in most cases continue to apply to them even though they have the status of independence.

General conventions

11. Of the general conventions, the most important is the revised 1949 Convention for Migration for Employment[31] including its three annexes (one or more of which can be excluded when a State ratifies the Convention). States have to provide free and accurate information on employment prospects and the relevant legislation and to facilitate departure and reception of migrants. Migrants are entitled to the same treatment as national workers in a number of respects: remuneration and fringe benefits; membership in trade unions; accommodations; and social security. Some restrictions on the last item are permitted, to ensure that there shall have been a minimum contribution or to restrict payments from wholly public funds to non-nationals. Equality in taxes and in the legal enforcement of the rights under the Convention is also guaranteed. The migrant is guaranteed the right to export or import currency and to transfer such part of his earnings as he wishes. The final guarantee relates to safeguards against expulsion. A migrant worker admitted on a permanent basis shall not be expelled if he becomes unable, due to illness or accident, after his entry, to continue to work. The protection extends to the members of his family who have been authorized to accompany him. A State is free, however, to disregard this obligation during the initial period of residence of the worker, so long as the period does not exceed five years.

12. The Convention thus deals with only a limited number of matters of immediate concern to the migrant, and even then in somewhat tentative terms. To some extent, the annexes, especially the first two, make up for the weaknesses of the Convention. The first two annexes deal with the recruitment, placing and conditions of employment—the first when the recruitment is other than under Government-sponsored arrangements for group transfer, the second when it is so. The latter annex provides more extensive protection than the former. Both provide that recruitment may only be undertaken either by public authorities or by private agencies licensed for this purpose, which must be supervised by public authorities. Illegal and clandestine recruitment or migration is prohibited and punishable. Both state the principle that the migrant should not have to pay for any services in connexion with his recruitment or placing. In countries where there exists a system of supervision of employment contracts of migrants, the migrant has to be given a copy of the contract before his departure, if possible; otherwise, he must be given a memorandum of some kind which states the main provisions of the contract, as well as the general conditions of work. The States undertake to supervise such contracts and to punish violations thereof. Additionally, the second annex provides that if the migrant, through no fault of his own, is unable to secure the employment for which he was recruited, or any other suitable employment, he shall not be responsible for the costs of transportation home for himself and his family. The recipient State is obliged to try to find him suitable employment which, however, does not prejudice the welfare of the national workers, and, in some instances, the State is obliged to provide maintenance and arrange for his resettlement.

13. The ILO has also adopted a Recommendation Concerning Migration (1949), which elaborates the provisions of the Convention and states, in particular, how the State should discharge its responsibilities with regard to the rules of recruitment, information services, facilities for reception of migrants and help with initial problems of settling in the new country. It goes beyond

[29] *Study of Discrimination in Respect of the Right of Everyone to Leave any Country, Including His Own and to Return to His Country* (United Nations publication, Sales No. 64.XV.2).

[30] Recommendation 2. Other early actions include Inspection of Emigrants Convention (21), 1926; and Migration (Protection of Females at Sea) Recommendation, 1926. Early efforts of the International Labour Organisation were not particularly successful. See Johnstone, *The International Labour Organisation* (1970), pp. 142-144.

[31] It replaced a 1939 Convention on the same subject, but which had excluded "indigenous workers", i.e., workers from dependent territories.

the Convention in suggesting greater protection against expulsion, easing of restrictions on employment opportunities and provision of social services, especially schooling.

14. Another general field in which the ILO has been active is that of social security. As early as 1935, it promoted the adoption of a Convention for the maintenance of migrants' pension rights[32] The Convention did not provide for new rights of migrants with respect to pensions, but dealt with some aspects of the problems that arise when a migrant has been contributing to certain pension schemes of different States, and ensures that the periods of his contribution to various schemes shall be added when determining eligibility. A Convention of 1962, the Equality of Treatment (Social Security) Convention, imposes an obligation to provide the same régimes for the non-national worker as the national worker, in a number of specified benefits The obligations of a State are, however, imposed on a basis of reciprocity; and it is envisaged that most of these schemes would be implemented through bilateral or multilateral agreements.

15. Before turning to the conventions dealing with migrant labour in dependent or formerly dependent territories, one should point to some of the deficiencies of the general conventions. They do not provide for any general right of immigration; they do not impose any obligation with respect to equal access to employment opportunities or vocational training; they do not guarantee the right of the migrant to participate fully in the affairs of the trade unions, including holding office, they do not deal with the rights of the family and appear to imply that there is no need for the family to join the migrant, at least if he is a short-term worker The general scheme of the conventions leaves important matters to be dealt with by bilateral agreements, so that the rights of the migrant depend upon further action, and often in situations when it cannot be assumed that his interests are of primary concern to the relevant parties to the agreements.

Conventions applicable to developing regions

16 There are no ILO conventions dealing expressly with migrant workers in the developing countries, although they would be covered by general conventions which deal with labour, which, where appropriate, have special provisions for migrant workers The most important is the Convention on the Recruiting of Indigenous Workers (1936), in which the word "indigenous" refers to the dependent peoples. Various principles underlie the Convention—recruitment by private agencies is to be prohibited, and when that is not desirable or possible, closely supervised. Recruiting is to be progressively replaced by a system of spontaneous offers to be employed, a principle which is reiterated in a Recommendation of the ILO.[33] In Africa, in particular, the evils of official recruiting have often been as great as those of private recruiting; in practice, official and private recruiters have generally collaborated Therefore, the Convention prohibits recruitment by administrative officers or pressure by traditional authorities The second principle stated by the Convention relates to the protection of the communities from which the workers are recruited. Before granting permission to recruit, the effects of the withdrawal of male adults on the social and economic life of the community must be taken into account, and, if necessary, a limit be placed on the numbers that can be recruited This limit is expressed as a percentage of the male adults of the population. The Convention states that, in certain circumstances, it would be desirable for the worker's family, to accompany or join him The third principle relates to the health and transportation of the migrants Transport costs are, in general, to be borne by the employers, and transport vehicles must meet certain minimum conditions of safety and hygiene, although it is envisaged that the workers may have to cover part of the journey on foot A medical examination is compulsory, with some exceptions permitted Fourthly, there are a number of administration provisions to ensure that the general principles shall be enforced So that the migrants may know the conditions of their employment, the employer must provide them with a provisional contract before their departure and this contract must be attested by a public official The Contracts of Employment (Indigenous Workers) Convention (1939) requires contracts (with various exceptions) to be made in writing, and prescribes the minimum terms of these contracts Other provisions seek to ensure that a worker shall not be separated from his family for excessive periods, and the employer has to provide facilities for his visit to his home before re-engaging him for another period

17. These Conventions are drafted in vague and general language and leave too much discretion to public authorities with regard to the extent and the manner in which the principles of the Conventions would be carried out. In any event, the rights guaranteed are minimal. In 1955, the ILO adopted a comprehensive Recommendation concerning the Protection of Migrant Workers in Underdeveloped Countries and Territories. Despite its paternalistic attitude, it goes beyond the Conventions in addressing itself to the problems of the migrants. In particular, it requires equal treatment of migrants with nationals, discusses the need to discourage migration where migration seems undesirable and points to the goal of settling migrants in their new places of work.

Bilateral and regional agreements

18. It has been a strategy of the ILO to encourage bilateral and regional agreements on migration. The 1949 Convention for Migration urges such agreements, and the accompanying Recommendation a model of such an agreement. A large num

[32] Maintenance of Migrants' Pension Rights Convention (48).

[33] Eliminating of Recruiting Recommendation, 1936

ments, mostly bilateral, have been negotiated; and they constitute an important element of the legal régime for the protection of migrants. It is not possible to summarize their terms in the brief scope of this paper, other than to make a few general comments. The emphasis on a series of bilateral agreements results in a system whereby migrant workers of different nationalities have different rights and produces discrimination among them. The agreements do not confer the right to immigrate. As a rule the agreements do not specify the volume of migration, although in Africa it has been customary to specify maximum annual quotas, primarily to prevent a complete denudation of young men from a community.[34] The agreements specify the public authorities of the two countries which would handle recruitment, selection, immigration and emigration; they specify the necessary documentation for travel and require the costs of outward travel to be borne by the employers or the country of immigration (most agreements also require the return journey to be underwritten by the employer; in other agreements, this point is negotiated between the migrant and the employer). Equality of treatment of migrants under the labour legislation is stipulated, and there are often separate and detailed agreements on social security. Some deal with the right of the worker's family to join him (although South Africa has always refused this provision, as well as the settlement of the migrant worker). In Europe, the right of the worker's family to join him usually arises only after the migrant has worked for a specified period and/or has a minimum period of his contract to fulfil. The right is also dependent upon the migrant being able to provide housing of a specified standard. In Africa, employers are usually required to provide housing and, on occasion, a parcel of land which the migrant cultivates for his own needs. Apart from clear provisions of equality of treatment and detailed arrangements on social security, those agreements do not go beyond the Conventions. They do provide for additional machinery to facilitate migration and for supervision of the basic standards. On the other hand, they interpose too many authorities (with vetoes) between the potential migrant and the country of immigration. The fact that a great deal of migration takes place outside the framework of these agreements (despite the clear intention that all migration should take place within the framework) suggests that in some ways, at least, the agreements fail to serve the interests of the migrants.

19. A brief account must be given of regional agreements, for they are clearly the most far-reaching in scope and, in part, suggest standards for other agreements. They are usually part of a wider framework of economic co-operation or integration and come close to giving a right of immigration into a signatory state. The best known examples are the systems in the European Economic Community (EEC) and in the Scandinavian countries, although the African and Malagasy Common Organization (OCAM) group of countries have adopted provisions similar to those of EEC. The EEC rules have as their objective the integration of the labour markets of the member countries, and the logic of this goal has resulted in a series of regulations which have increasingly assimilated the position of the EEC worker into the domestic environment, in terms of job opportunities, residence and social security. The enforcement machinery of the Rome Treaty is available for the enforcement of the rights guaranteed to the workers. The regulations cover only a small proportion of the migrant workers in Europe, only Italy being a country of emigration; but it has a larger importance in establishing standards which will be increasingly difficult to withhold from other migrant workers. It is significant, also, that in providing a model of regional arrangements for labour migration, and apart from the case of OCAM, there have been discussions concerning the introduction of similar schemes among the Arab countries and on a continental basis in Africa.

Conclusion

20. The examination of the legal régime makes clear that there are serious deficiencies with respect to rights of the migrant worker. First, relatively few countries have ratified the Conventions. The most important countries of immigration in Africa—the Ivory Coast, Southern Rhodesia and South Africa—have not done so, while Zambia, which is also an important country of immigration, has excluded all the annexes of the Convention. In Europe, Switzerland, a major importer of labour, has not ratified the Convention. Secondly, even if more countries could be induced to ratify the Conventions, as has been urged in recent United Nations Declarations, serious deficiencies with respect to the rights of the migrants would remain. One of the most important of the ILO Conventions, Discrimination (Employment and Occupation) (1958), does not cover migrant workers, while the "migrant" Conventions leave important rights unprotected. The Conventions are particularly weak on family-related rights, which have assumed great importance in recent United Nations thought on human rights, on equal access to job opportunities, job mobility and rights of residence and adequate protection against arbitrary expulsion. Thirdly, the limited rights covered by the Conventions are not fully effective, which is due in part to the fact that some migration is not conducted under official auspices. (For example, in France, in 1967, only 22 per cent of migration was official; in 1968, 18 per cent was official; and in 1969, 33 per cent was official.) Even when migration is not illegal, the migrant finds it difficult or inexpedient to invoke legislative or treaty guarantees, in part because, in some instances, migrants feel too insecure to want to battle with employers, landlords and the authorities. It is not

[34] For information on various national quotas, see Commission for Technical Co-operation in Africa South of the Sahara, *Migrant Labour in Africa South of the Sahara* (New York, International Publications, 1961).

enough to remove legislative restrictions or discrimination. To make that equality real, positive obligations have to be placed upon public and private authorities. While this is done to some extent, much more is needed.

21. Conventions and other legal instruments have their uses and are an essential element in a strategy for the amelioration of the conditions of migrants. But it is clearly necessary to go beyond them. While the ILO has urged economic development in the poorer developing countries, its general attitude towards migration has been that it is a good thing which should be promoted as a mechanism that adjusts demand and supply of labour. The United Nations Declarations also appear to subscribe to the virtues of free emigration, although it is tied to necessary safeguards This posture may be criticized, not only because of the hardship it would cause migrants but because there is evidence that migration damages prospects of growth and development in the areas of emigration. The remedial action that the United Nations and the ILO take must be clearly related to the needs and conditions of different situations. A universalist, global approach may not be valid The two regions that are the concern of this paper, Africa and Western Europe, present different problems, which ought to be approached on the basis of different strategies In both regions, migrants seem to be in urgent need of protection. If there is an economic recession in Europe, much talked about at the current time, the migrant workers might well be the first victims, while in Africa, pressures for and plans of "localization" threaten expulsion for thousands of long-term resident migrants.

22 In many ways, the problems of African States are inherited from the colonial masters. Not only is the migration of people, especially for mining, industrial and plantation work, the result of colonial policies, but the very inability of the new States to deal with the problem is attributable to the under-development of those States, for which imperial and neo-colonial policies and practices are responsible. Most of the migration took place before independence; and, indeed, the very fact of nationality is a new phenomenon. As these States, limited in their development and resources, attempt to deal with the numerous problems of nation-building, as their fragile political systems threaten to collapse and as their citizens demand employment and services, it is not surprising that they turn against non-nationals. In many States, non-nationals occupy important places in the wage economy and sometimes dominate them. In these States, the replacement of non-nationals by nationals is seen as important for the achievement of economic independence and autonomous decision-making The fact that such strategies fail to identify the real causes of the lack of economic independence, and so are unable to solve the problems, is not often perceived. What appears likely is that expulsions of populations will take place. They have often taken place in conditions of extreme hardship and have been accompanied by ugly manifestations of xenophobia As an immediate practical measure, international agencies and the Organization of African Unity (OAU) should adopt a charter to deal with the problems that arise from expulsion. A majority of OAU States are States of either immigration or emigration, and are thus likely to be interested in an orderly resolution of the difficulties. It is unrealistic, as is suggested by the ILO paper on migrant workers in Africa, that African States should adopt the principle of free movement on the continent It is more realistic to assume that expulsions will take place and plan to minimize hardships by laying down minimum conditions when expulsion occurs Among these conditions are the right to take belongings out of the country and providing adequate notice of expulsion so that one's affairs may be terminated in an orderly manner. It is also necessary to deal with the obligations of the State of the expellees, including the obligations of the State to receive the expellees and to provide them with a suitable programme of rehabilitation. The long-term solutions, of course, are different and must come to terms with the real causes of under-development, which means the adoption of necessary strategies for growth and equity The solution that is sometimes proposed, that investment should take place in States with labour surplus is unlikely to help This policy may discourage external migration, but will promote internal migration, and the problems of urban slums and general insufficiency of services are likely to be just as harsh What is needed is an emphasis on rural development and the necessity to redefine man's relationship to machines, as well as the principles of industrial organization

23 In Europe, the problem arises largely, though not exclusively, from the recruitment of migrant labour to run the industrial undertakings They are to make up for the shortages of labour in Europe or for the refusal of its indigenous population to do certain unpleasant tasks The surplus available in the poorer developing countries is regarded as a "reserve labour force", to be used or disregarded as necessary. It is viewed almost entirely in terms of the dynamics of the European capitalist industrial economy The countries of origin of migrant labour do not often show any greater interest in the migrant Migrant labour is seen as an export whose remittances provide foreign exchange and whose absence from the State eases the pressure from Governments unable to cope with problems of neo-colonialism, corruption and inefficiency It is, therefore, doubtful if there is any State or institution which is truly concerned about the plight of the migrant in Europe The fragility of convention and legal guarantees before the forces of the market is a basic factor to be taken into account. It is necessary to establish new, or to reinforce existing, institutions to secure the enforcement of the rights of the migrants The rights themselves have to be extended, and the discriminatory régimes for workers of different nationalities should be ended.

24. Over the coming decades, the number of migrant workers is likely to increase rather than decrease. Their social and political problems are also likely to become worse. This review has indicated the gaps that exist in the legal régime for their protection and has suggested how these gaps might be filled. The paper has not explicitly discussed the mechanisms that are available for the enforcement of the régimes, although it has been argued that they are defective. Few national or international bodies are charged with the protection of the rights of the migrant. The progressive development of these rights may well require that a body be so specifically charged. The impact of the UN Office of the High Commissioner for Refugees on the status and rights of the refugees shows the usefulness of such a step and suggests a possible model. Careful thought needs to be given to the institutional questions—what the powers and responsibilities of such a body should be, its relationship to national authorities, access of migrants to this body and whether a new body needs to be established or an existing one given this jurisdiction. What seems obvious is that a body to which there is easy access and which has effective power can do a great deal—strengthening national institutions, establishing standards, mobilizing opinion and so forth—to keep in view the currently sorry plight of the migrants.

POSIBLE IMPACTO DE LAS TENDENCIAS DE POBLACION SOBRE LOS CONCEPTOS DE LOS DERECHOS HUMANOS Y LOS VALORES *

Violeta Sara-LaFosse **

1. Es sabido que América Latina es la región del mundo que presenta los más altos índices de crecimiento de población, y que ese crecimiento se ha hecho evidente a partir de la década de los cincuenta a través de la expansión tan vertiginosa como desordenada de los centros urbanos principales.

2 Ahora bien, la urbanización acelerada de los países latinoamericanos no sólo ha puesto en evidencia la ruptura de equilibrios seculares en la dinámica de población, sino que ha mostrado la caducidad de las estructuras sociales bajo su actual conformación Algunas de ellas se mantienen, apenas modificadas, desde su origen colonial, y en general expresan y corresponden a formas de relación y valoración opresivas y discriminatorias

3. El rechazo del sistema y la aspiración de cambio consiguiente por parte de los marginados y dominados, al mismo tiempo que los mecanismos propios del sistema para mantenerse, sumados al esfuerzo de los beneficiarios, han determinado sin duda intentos diversos para superar la situación y la paulatina radicalización de aspiraciones y estrategias Es así como, durante la década de las sesenta, hemos visto aparecer brotes revolucionarios en casi todos los países de la región

4. El movimiento popular y la acción de las minorías selectas continúa en este esfuerzo de profundización y esclarecimiento en medio de incertidumbre y fracasos, pero reivindicando permanentemente el cambio y la apertura de nuevas posibilidades A esto se debe la actitud crítica, el escepticismo sobre las vías medias y los "milagros"; por eso se halla la radicalización y en general el cuadro de una América Latina convulsionada, marcada por la violencia tanto de [illegible] consolidar [illegible] con fuerza [illegible]

5 La coyuntura económica, política y social de América Latina, marcada por la voluntad por una parte y la resistencia al cambio por otra, podemos entenderla como una situación conflictiva que surge de una no correspondencia entre las declaraciones acerca de los derechos humanos, de los cuales son suscritores todos los países, y la posibilidad real del ejercicio de esos derechos que en ellos se concede. la lucha por el cambio es una lucha por acceder al ejercicio de derechos formalmente ya reconocidos.

6 Más aún, las propias condiciones de existencia de las poblaciones ponen en evidencia que hay otros derechos que no están indicados explícitamente ni reconocidos la lucha por el cambio es también una lucha por lograr el reconocimiento de esos otros derechos.

7 La coyuntura de América Latina por otra parte, está indudablemente marcada por la persistencia del subdesarrollo y los esfuerzos consagrados a superarlo Ahora bien, la situación de subdesarrollo puede ser considerada como causa de la limitación del ejercicio de derechos humanos y por tanto, el desarrollo como una condición para su pleno ejercicio Además, los esfuerzos de desarrollo se apoyan en diversos elementos dinámicos del sistema social y entre otros en la población, como motor o condicionante y como beneficiario del proceso, de manera que, es en el marco de la concepción y de los esfuerzos de desarrollo donde debemos inscribir la problemática del crecimiento de población y la del ejercicio de los derechos humanos

8 Ahora bien, los diagnósticos del subdesarrollo y los esfuerzos para salir de él no son unívocos Hay diversas formas de encauzar el proceso de desarrollo según opciones tomadas habitualmente por los gobiernos de los distintos países y, a su vez, estas opciones corresponden a interpretaciones distintas del subdesarrollo.

9. En este documento, no vamos a especificar las distintas opciones posibles para encarar el subdesarrollo Vamos solamente a caracterizar dos opciones opuestas que son como dos polos de atracción, frente a los que los distintos países se acercan en mayor o menor medida según las medidas que adoptan en su política concreta.

10. Hemos retenido como opciones tipo de desarrollo, la modernizante y la revolucionaria. Creemos que a cada opción corresponde una explicación distinta del problema poblacional, una política de desarrollo distinta y finalmente una indicación explícita de ciertos derechos humanos con preferencia a otros

[illegible]

11. Dentro de la concepción del desarrollo como un proceso de modernización se explica la superación del subdesarrollo como la transición de una sociedad tradicional a una sociedad moderna. Se considera que los países subdesarrollados están en una etapa de evolución que seguirá las pautas de los países ya desarrollados. Dentro de este contexto se considera que el crecimiento expansivo de la población es el obstáculo más importante al proceso de desarrollo y por lo mismo sería una de las causas que hacen imposible o retardan el despegue hacia el desarrollo.

12. La vía para salir del subdesarrollo sería la de asegurar la eficiencia creciente del sistema productivo y la de reducir las presiones que, debido a la demanda de bienes y servicios y a los movimientos sociales, pueden plantear una población en rápido crecimiento. Es pues indispensable la reducción del crecimiento de la población como condición de éxito de todo otro esfuerzo de desarrollo, y en este sentido, es capital la política de población.

13. La comprensión del desarrollo como un proceso revolucionario explica el subdesarrollo como la resultante de la colonización, que permitió el despojo de los países colonizados y el desarrollo de los colonizadores, situación que se mantiene por la dependencia económica a que están sometidos los países subdesarrollados y por la dominación interna como sistema social que prevalece en dichos países. Consecuentemente con esta visión, la única forma de salir del subdesarrollo es romper los lazos de dependencia externa y transformar las estructuras internas de la sociedad. El crecimiento acelerado de la población es un problema más del estado de subdesarrollo, pero no es el más importante.

14. Bosquejadas las opciones opuestas frente al reto del desarrollo, podemos indicar detalladamente las implicaciones del crecimiento demográfico tanto en la formulación de ciertos derechos humanos, como en las relaciones personales y sociales que están en la base de esos derechos. Las relaciones que veremos preferentemente son las familiares, laborales y comunales.

Crecimiento de población y relaciones familiares

15. Las implicaciones del crecimiento de la población en la conformación de la estructura familiar son casi inmediatamente perceptibles, y en todo caso lo son más claramente que en otras esferas de la vida social. Este hecho nos sugiere la conveniencia de iniciar este análisis refiriéndonos a la familia.

16. Por otra parte, por dedicación personal, hemos acumulado elementos de reflexión y evidencias empíricas sobre cuestiones referentes a la familia, en mayor medida que sobre otros temas; de manera que, es en este campo donde trataremos de ofrecer un examen más completo de la situación y de las posibilidades en las alternativas de bajo crecimiento y crecimiento expansivo de la población.

17. En las etapas de bajo crecimiento demográfico debido a altas tasas de mortalidad, encontramos que los pueblos que están en esa situación aprecian grandemente la fecundidad humana. En realidad, la supervivencia de pueblos diezmados por las enfermedades, el hambre y las guerras depende del nacimiento del mayor número posible de hombres.

18. La consecuencia de esta valoración y forma de supervivencia, si no es búsqueda de poderío, es que la mujer pase la mayor parte de su vida embarazada. Sin embargo, la fuerte mortalidad infantil le permite dedicarse simultáneamente a actividades productivas sedentarias como las tareas agrícolas, o los trabajos artesanales que contribuyen o hacen posible por ellos solos que la familia satisfaga sus necesidades de subsistencia. En cuanto a los hijos sobrevivientes, se les incorpora pronto al trabajo productivo.

19. Las funciones de la familia son principalmente la reproductiva y la económica. La mujer es valorada en tanto que es fecunda, y consecuentemente se llega a considerar que la única finalidad legítima y por tanto socialmente deseable de la relación sexual es la de reproducción. Al mismo tiempo, la gratificación sensorial resultante de la relación sexual, acentuada si la mujer es joven y bella, permite también valorar a la mujer como objeto sexual. Indudablemente esta segunda valoración de la mujer dura mientras el trabajo rudo, las condiciones de vida y las sucesivas maternidades no han mermado sus atractivos o destruido su belleza.

20. Más adelante, una reducción de la mortalidad no acompañada consecutivamente de una reducción de la natalidad ha provocado, como es conocido, un fuerte crecimiento de la población con efectos diferentes según las coordenadas económico-sociales y culturales donde se ha producido en las diferentes regiones del mundo.

21. En efecto, este crecimiento se produjo en primer lugar en países cuyo propio adelanto científico y técnico y cuyos niveles de vida en general les permitieron reducir la mortalidad. Posteriormente, se produjo el crecimiento en países en los que se habían introducido las técnicas médicas y sanitarias de los países avanzados de forma que permitieron combatir las enfermedades y prolongar la vida humana. En este último caso, el mejoramiento de tipo sanitario no estuvo acompañado de una elevación del nivel de vida de las poblaciones.

22. Esta diferencia es muy importante, porque en los primeros países el adelanto científico y técnico fue el fruto del desarrollo de una cultura particular. La reducción de la mortalidad así como la reducción de la natalidad consecutiva estuvieron inscritas dentro de dicho desarrollo y provocaron cambios de mentalidad y de valores en forma espontánea.

23. Por el contrario, en los países donde la reducción de la mortalidad se debe a técnicas importadas que no corresponden a la evolución de sus propias

culturas ni al desarrollo de su economía, se produce un grave desequilibrio, que al tratar de solucionarse con la introducción de técnicas de reducción de la natalidad que contradicen sus valores fundamentales y que no les ofrecen valores alternativos aceptables dentro de su marco cultural, provocan un fuerte rechazo.

24. En esta situación se encuentran actualmente la mayor parte de los países latinoamericanos en los que la reducción de la mortalidad no corresponde a mejores niveles de vida Por el contrario se da en sociedades en que una gran mayoría tiene un nivel de vida muy bajo, sociedades de pasado colonial que presentan estructuras sociales fuertemente estratificadas, en las que además de la estratificación por clases se presentan otras estratificaciones por origen racial y por formas culturales; sociedades en que se configura una pirámide social de muy amplia base y estrecha cúspide, en las que las grandes mayorías se encuentran marginadas tanto económicamente como en su participación social, cívica y política.

25. En estos países de reciente y, además, drástica reducción de la mortalidad, la mujer ve su participación restringida, aún con respecto a los trabajos sedentarios que realizaba en etapas anteriores Hay pues, en este período, motivos adicionales que limitan su actividad productiva Por un lado, el aumento del número de hijos vivos y el esfuerzo para atender a su crianza que le toma gran parte, sino todo, el tiempo antes disponible, y, por otro lado, la industrialización y mecanización de las producciones en que solía participar la desplazan o hacen no competitivos sus productos

26. La organización industrial de la producción en torno de plantas o baterías de maquinaria, de la administración y los servicios en forma concentrada, con definición específica de tareas y supervisión permanente, crea la necesidad de concentración de trabajadores y permanencia en los locales Ahora bien, las unidades de producción, al exigir presencia y dedicación completa a los trabajadores, les impiden cumplir al mismo tiempo con la función socializadora al lado de sus hijos. Esa función quedará pues exclusivamente librada al cónyuge que puede permanecer en el hogar, es decir la madre, quien a su vez deberá optar entre trabajar o abandonar a los hijos.

27 En resumen, la creciente reducción de la mujer a tareas domésticas relativas a la crianza de los hijos, acrecienta su valoración en función de su maternidad, al mismo tiempo que la división del trabajo por sexo se acentúa y las posibilidades de real ejercicio de los derechos humanos es diferente

28. Al mismo tiempo, y en forma concurrente a lo que llevamos dicho, el varón de los sectores mayoritarios de la población, tal como ya señalamos anteriormente, está marginado de una participación real en la esfera económica, sindical, cívica y política, en razón de las características estructurales de la sociedad Consecuentemente, ve reducidas y tal vez anuladas sus posibilidades de autoestimación en términos del cumplimiento de sus funciones como ciudadano, como trabajador y como padre de familia. Esto le lleva a valorarse casi exclusivamente por su capacidad sexual y progenitora en forma exacerbada y llega a la ostentación, lo que evidentemente, está cargado de consecuencias sobre la función y la valoración de la mujer

29. Resulta sumamente interesante observar que en todas las poblaciones marginadas aparecen los mismos valores en torno de la mujer y su papel, así como respecto al papel masculino Tendríamos así algunos rasgos de una subcultura propia del mundo marginado, formas culturales que resultan de un esfuerzo de adaptación a las condiciones socioeconómicas de su existencia.

30 La percepción de esta realidad, aún limitada al conocimiento de sus aspectos más generales, hace parecer como ajena y no significante la proclamación formal de derechos a "decidir libre y responsablemente el número y el momento del nacimiento de los hijos", a "una educación e información adecuada"; y a la provisión de los medios necesarios para hacer posible esa decisión libre y responsable

31. Es indudable pues que la proclamación de estos derechos no responde a los requerimientos culturales de las poblaciones hacia las cuales va dirigida, ni a sus posibilidades socioeconómicas de ejercerlos La proclamación de los derechos que acabamos de mencionar es más bien un caso típico de reconocimiento de relaciones humanas existentes en un determinado contexto socioeconómico y cultural, en este caso el de los países desarrollados y su proclamación extensiva a otros países cuya población mayoritaria vive otra situación económico-social y otras formas culturales Los derechos proclamados vienen a ser incongruentes con los datos de la situación

32 En efecto, la posibilidad de decisión libre es mínima porque supone un nivel de instrucción que permita un acceso crítico a la información, por otro lado, la "responsabilidad" entendida en este caso como la capacidad de mantener y educar convenientemente a los hijos, dadas las condiciones de subempleo y desempleo de las mayorías marginadas lleva necesariamente a negarles el derecho a procrear Paralelamente habíamos señalado anteriormente que en estos sectores la mujer es valorada principalmente como madre o como objeto de placer, y el hombre no tiene otra forma de valorarse más que por su capacidad sexual y procreadora En este contexto pues, una campaña de difusión de los derechos a la procreación "libre y responsable" que ignora la incapacidad por parte de los interesados de ejercer esos derechos lleva a destruir sus valores más preciados y a producir en los individuos una pérdida de significación con el consiguiente riesgo de anomia En realidad, no se dejaría otra salida que la prostitución para la mujer y la delincuencia para el hombre. El aumento de la [illegible] ón [illegible] enfermedades venéreas y el [illegible] del

alcoholismo y otros comportamientos aberrantes en los últimos años, constituyen otros tantos indicadores de esta situación.

33. La formulación de estos derechos sin embargo, con lo que implican como forma, contenido y criterio de selección de que están privilegiados, es un hecho que solicita explicación. Por nuestra parte, pensamos que esta explicación está estrechamente ligada a la opción de desarrollo subyacente. Así pues, como habíamos señalado anteriormente, la opción modernizante considera que el crecimiento excesivo de la población constituye el obstáculo más importante al proceso de desarrollo; y, dentro de esa óptica es fundamental indicar con explicitud las bases fundamentales de un comportamiento diferente respecto a la procreación. En realidad, la formulación de derechos, cuya legitimidad no discutimos, resulta, por la oportunidad de su formulación y difusión, justificación y racionalización última de políticas previamente definidas.

34. Si esto ocurre como consecuencia de una opción modernizante, es evidente que una comprensión de la problemática del subdesarrollo como una situación de dependencia externa y dominación interna hará definir los objetivos de desarrollo en forma distinta y jerarquizarlos, una vez definidos, en forma diferente. Los mismos principios sobre la decisión libre y responsable para tener hijos, el derecho a la educación e información y el acceso a medios que hagan posible esa decisión libre, cobrarán otra significación y aun contenidos más ricos.

35. Así, reconocer la marginación en general y concretamente el desempleo que afectan a capas importantes de la población, es reconocer la imposibilidad, para el individuo que carece de trabajo, de ejercer el derecho a tener hijos responsablemente. En otras palabras, el principal medio que le permitiría tomar esa decisión libre y responsable es un trabajo estable y bien remunerado, que la sociedad no le ofrece.

36. Una primera condición viene a ser entonces el derecho al trabajo, y el ejercicio de este derecho es una conquista política que exige la participación activa de los individuos afectados. Es evidente que uno de los caminos para lograrlo será el de una educación e información que no se limite a la esfera de lo familiar y sexual, sino que abarque una educación política que permita al individuo conocer sus derechos, y los mecanismos económico-sociales que le impiden ejercerlos.

37. Esta educación político-social tiene además el efecto de permitir que el individuo recupere la conciencia de su propio valor como persona humana tanto en su dimensión individual, como familiar y social. Le permitirá cuestionar la valoración exclusiva otorgada a la procreación y a la capacidad sexual ubicándolos en el contexto de otros valores alternativos, como el valor del trabajo en tanto que esfuerzo creador a través del cual se realiza a sí mismo, contribuye al mantenimiento de los suyos y produce bienes y servicios para la colectividad.

Reducción de natalidad y relaciones familiares

38. Veremos ahora cuál es el posible impacto de un crecimiento moderado de la población, debido a una natalidad moderada, sobre el valor de la mujer, de la relación sexual, de la paternidad y de los hijos.

39. La reducción del número de hijos y la prolongación de la vida humana, hacen que la tarea reproductora ocupe una mínima parte de la capacidad y de las energías de la mujer. La mujer puede realizar múltiples tareas, y no solamente las sedentarias y aisladas por estar circunscritas al ámbito doméstico en que actuaba previamente. Se cuestiona la significación casi exclusiva de la mujer en términos de su capacidad reproductora, y del mismo modo se cuestiona la significación predominantemente reproductora de la relación sexual. Se concibe la unión sexual de hombre y mujer como una relación personal, un encuentro de naturaleza sicosomática que asegura la estabilidad emocional de la pareja. La belleza de la mujer, en esta perspectiva, no es una garantía ni un requisito para que la relación sexual se dé significativamente. En definitiva se pone en tela de juicio la tradicional valoración funcional de la mujer en términos de objeto reproductor y de objeto sexual, sublimada en los valores de la maternidad y de la belleza.

40. Por primera vez la mujer genéricamente y no en forma excepcional ve la posibilidad de tener una significación personal y no funcional, de tener un valor en sí misma y no por la utilidad que presta en función de otros, con exclusión de poder desarrollar plenamente todas sus capacidades y potencialidades.

41. Sin embargo esta posibilidad que se abre a la mujer, marcada milenariamente por la división del trabajo por sexo, sólo tendrá viabilidad en una sociedad que rechace como negativa la división del trabajo ya sea por sexo, raza, clase, etc.

42. En los países que han alcanzado altos niveles de desarrollo, interesados en la máxima productividad, se tiende a acentuar la división del trabajo en el hogar, en lugar de reducirla. Esta situación se repite en la clase media de los grandes centros urbanos de América Latina. No se reconoce ni el derecho ni el deber del padre de ocuparse de la crianza de sus hijos. Se supone que el hombre no tiene otra potencialidad que la del trabajo productivo, en el cual se le exigen rendimientos máximos. Siendo al mismo tiempo sociedades de consumo, se estimula en la mujer el afán de posesión, de compra de objetos que han de compensar en ella el vacío que significa su vida. Se exalta la belleza y se comercializa el sexo, consolidando así la imagen de la mujer como objeto sexual.

43. Las contradicciones entre la nueva significación de la mujer exigida por las tendencias demográficas y el mantenimiento de la mujer en una situación de marginación en cuanto a la posibilidad de participación plena, autónoma y en todos los niveles de decisión son manifiestas y provocan reacciones de todo tipo.

44 Es importante anotar que la condición social y jurídica de la mujer no podrá modificarse sustancialmente mientras la mujer vea su vida ligada en forma prioritaria a la realización de tareas domésticas. Hemos señalado cómo el aislamiento en el cual se desempeñan estas tareas, impide a la mujer tener una perspectiva social del trabajo, se agudiza en ella el individualismo imperante en el sistema, retrayéndola de la participación cívica y política.

45. En los casos en los que la mujer participa también en el trabajo productivo, es necesario recalcar que su situación no mejora radicalmente. En efecto, en una sociedad que ha consagrado la división del trabajo humano y la distinción de personas, los trabajos reservados para la mujer, son generalmente menos interesantes y no representan para ella sino un medio de generar o aumentar sus ingresos. Difícilmente puede la mujer aspirar a desempeñar trabajos interesantes que exigen un alto nivel de dedicación puesto que, cuando la mujer trabaja, generalmente no es ayudada ni aun parcialmente en las tareas que implica el ocuparse del hogar y de los hijos. Ella tiene que afrontar una doble dedicación, lo cual necesariamente afecta su posibilidad de dedicación plena al trabajo y a los compromisos cívicos, gremiales o políticos que dicho trabajo puede abrirle como perspectivas.

46 Sólo en los países que se rechace una sociedad dividida será posible considerar a la mujer con plena capacidad de participación social, tanto económica como política. Esta posibilidad de ejercicio de derechos humanos fundamentales por parte de la mujer será posible cuando se reconozca su aporte a la conservación de la especie humana, que es incluso mayor que él del varón, y su derecho y posibilidades de aportar a la construcción de la sociedad Se trata de un reconocimiento por la sociedad y no de un requerimiento de cualquier tipo de protección Los hijos que tiene la mujer no son de su exclusiva responsabilidad, sino que las responsabilidades que derivan de la existencia de éstos deben ser compartidas con el padre y con la sociedad que se beneficia de nuevos miembros.

47. Este reconocimiento exige que se proclamen los deberes y derechos no sólo de la madre sino también del padre de familia a ocuparse personalmente del cuidado que el niño necesita y exige también que donde las exigencias de la producción requieran que todo trabajador varón y mujer se dedique a tiempo completo al esfuerzo productivo, las empresas que tengan trabajadores varones o mujeres provean los servicios adecuados para el cuidado de los niños mientras sus padres trabajan. La comunidad debería ofrecer igualmente esos servicios tanto más que los padres deben tener oportunidad de participar en actividades artísticas, gremiales, deportivas, políticas o culturales en general

48. En resumen podemos decir que cuando se cuestiona la división del trabajo es posible cambiar la significación funcional de la mujer por una significación personal; es posible cambiar la valoración exclusiva en términos de la maternidad y de la belleza, proponiendo como alternativa otros de tanta o mayor significación tales como el valor de la realización personal y social por medio de un trabajo creador, de una relación sexual personalizante y de la participación plena en la construcción de la sociedad

49. La disminución de la preponderancia otorgada a la madre frente a los hijos, hace posible que la paternidad recupere y aun supere la significación que había perdido durante los procesos de industrialización y urbanización.

50. Es decir que la paternidad no quede reducida a la dimensión de proveer lo necesario para el mantenimiento económico de la familia y a lo más la iniciación profesional de los hijos varones, sino que se extienda a un mundo de relaciones más amplio y continuo, o sea que se puedan establecer lazos de compañerismo entre el padre y los hijos de ambos sexos.

51. El padre volvería a asumir un rol socializador con sus hijos, quienes en este contexto tendrían la posibilidad de poderse desarrollar en forma más armónica e independiente, ya que no estarían fijados en forma exclusiva a uno de sus progenitores Igualmente, es posible que el hombre adulto, en relación positiva y permanente con los otros miembros de la familia, pueda alcanzar una mayor madurez y equilibrio emocional

52. En realidad, al disminuir la preponderancia otorgada a la mujer y al compartir el hombre los derechos y responsabilidades familiares, la presencia humana del padre y las relaciones que entabla se están valorizando

53. En este contexto, parece bastante claro que la familia cobrará una importancia y significación distintas de las que tenía anteriormente Por la misma razón afirmará y promoverá valores distintos, aunque condicionada por las normas que rigen la sociedad en su conjunto.

54 Así pues, dentro de una sociedad marcada por el consumo, la familia continúa caracterizándose como unidad económica, pero esta vez ya no como unidad de producción de bienes para el mercado, sino de transformación de bienes no terminados y de producción de servicios para el consumo final familiar. Al mismo tiempo, es unidad de consumo de bienes y servicios producidos al exterior de la unidad doméstica

55. En una sociedad tal que por lo general establece una fuerte especialización de funciones, los papeles de marido y mujer resultan complementariamente marcados por la función económica de crear y utilizar recursos El marido está encargado incluso por el Derecho Positivo, de proveer los recursos necesarios (ingresos) para la compra de bienes finales o semifinales, y la esposa, por su parte, de efectuar la transformación de los bienes y de producir los servicios, incluido el de la adquisición de bienes de mercado

56 Al contrario, en una sociedad en que la realización de las personas sea el fundamento de bienestar

en lugar de los mayores niveles de consumo, la participación creativa de todos viene a ser una condición primordial. En esa sociedad, la mujer tendría la posibilidad y aun el imperativo de participar activamente a través de su trabajo, de sus inquietudes y aportes culturales y finalmente de su militancia cívica y política. Tendríamos pues todavía otra situación en que la familia puede cobrar una nueva significación más cualitativa y menos cuantitativa; más personal y menos funcional.

57. Es evidente que si no hay exclusión de ninguno de los cónyuges de alguna esfera de actividad socialmente valedera, la relación entre ellos puede ser efectivamente igualitaria, ya que no hay necesariamente dependencia económica de uno respecto del otro, y habrán además experiencias sociales que alimenten un intercambio constructivo y recíproco. La igualdad y reciprocidad en la relación permite por lo mismo la vivencia de una sexualidad más plena y no interferida por intereses materiales.

58. La participación igual y no restringida de marido y mujer en el mundo exterior y en la educación de los hijos les permite, por otra parte, tener un enfoque semejante de los problemas familiares y sociales, y por tanto, al compartir intereses y expectativas pueden encontrar en la vida familiar el apoyo emocional requerido para un desarrollo equilibrado de su personalidad. Aún más, la percepción de su propio desarrollo personal abre a los padres a la comprensión de su papel paternal como identificado principalmente con el desarrollo pleno de la personalidad de los hijos tanto en su dimensión individual como social. Los valores que se pueden interiorizar como expresión de las relaciones que se entablan son los de solidaridad, no sólo al interior del grupo familiar sino en relación a la comunidad. La mujer puede encontrar finalmente su plena significación como persona humana y no meramente como un ente funcional. Al hombre se le da la oportunidad de un desarrollo más equilibrado al realizar completamente su paternidad. La vida humana expresada en las expectativas que se tienen respecto a los hijos viene a ser valorada en términos cualitativos. La calidad de la vida se debe medir en términos de personalización progresiva y no de comodidad material alcanzada.

Relaciones laborales y comunales

59. Hemos señalado que las implicaciones de las tendencias de crecimiento demográfico sobre las relaciones familiares son mucho más perceptibles que las implicaciones sobre las relaciones laborales o comunales. Sin embargo no por ser poco perceptibles pueden ser ignoradas al tratar de explicar la aparición o acentuación de ciertos tipos de relación a esos niveles, el afloramiento de formas de organización y finalmente la apertura de las agrupaciones, formales o no, hacia definiciones políticas de tendencia revolucionaria en amplios sectores de la población latinoamericana. Anotemos por último que este conjunto de actitudes y esfuerzos de asociación, se concretan en razón de una reivindicación de cambios profundos en la sociedad, justamente, en nombre de derechos humanos no reconocidos aún por las propias Naciones Unidas o cuyo ejercicio real está impedido, de hecho, por la sociedad.

60. El crecimiento expansivo de la población en los países latinoamericanos, dada la estructura social imperante, ha significado en primer término un aumento progresivo del desempleo y la aparición y proliferación de múltiples formas de empleos de poca categoría. Esta abundancia de mano de obra disponible redunda en un bajo nivel de salarios y en una situación de gran inestabilidad en el trabajo, en razón de una insuficiencia dinámica de las economías latinoamericanas para crear los empleos que serían necesarios:

61. *La situación, así descrita, ha estimulado el* fortalecimiento en la última década del movimiento sindical, en forma que los conflictos de trabajo de mayor envergadura han correspondido a los problemas inherentes a las negociaciones entre patrones y trabajadores. Las reclamaciones salariales forman parte de los motivos que generan conflictos; pero no son los únicos ni los más importantes en cuanto al número de trabajadores que se ven involucrados. Existe pues un malestar que no se remedia con elevaciones de salarios monetarios ni con prestación de servicios por los empleadores. La reivindicación de fondo es una participación en la toma de decisiones, y por tanto se agudiza el rechazo del monopolio actualmente ejercido por los empresarios.

62. Por otro lado, la enorme masa de empleados de categoría inferior cuyas principales ocupaciones de intermediarios comerciales, prestadores de servicios o pequeños artesanos son ejercidas en forma independiente, ofrecen paradójicamente la oportunidad de un desarrollo de la capacidad de iniciativa y de toma de decisiones. Al mismo tiempo estos amplios sectores marginados que viven en los medios urbanos más desarrollados perciben más fuertemente las injustas desigualdades sociales fruto del sistema imperante.

63. Todos estos elementos reclaman una concepción del trabajo más amplia que la de medio para "ganarse la vida". Exigen que se reconozca su carácter personalizante, a nivel social e individual: su significación como factor primordial aunque no preponderante en la producción y como forma de realización individual. Se rechazan entonces relaciones laborales basadas en una división del trabajo que pone de un lado a los que toman las decisiones y dan las órdenes, y del otro a los que solamente las ejecutan. Se buscan relaciones democráticas en lugar de las jerárquicas.

64. Este rechazo de determinadas relaciones laborales y la búsqueda de una nueva valoración del trabajo humano consiguiente llevan a la concepción de derechos humanos que así lo reconozcan y lo hagan posible. El rechazo de situaciones laborales que reducen al hombre a ejecutante, es decir a pieza de una

maquinaria, se basa precisamente en el reconocimiento de la dignidad de la persona humana.

65 Ahora bien, la dignidad de la persona humana está reconocida cuando se afirma que "la educación debe orientarse hacia el pleno desarrollo de la personalidad humana y del sentido de su dignidad" y cuando se establece que "Nadie será constreñido a ejecutar un trabajo forzoso u obligatorio". Este último derecho sin embargo, es desconocido cuando el trabajador debe aceptar un trabajo que lesiona su dignidad, al desconocerle su capacidad de decisión, pero que no puede rechazar porque de él depende su supervivencia y la de los suyos.

66. Creemos, pues, que el reconocimiento de la dignidad del trabajo humano y la denuncia de aquellas estructuras económicas que la ignoran definen la pertinencia para que se proclame el derecho del hombre y de la mujer a un trabajo social que les permita realizarse personalmente y en forma solidaria en un esfuerzo de servicio a la comunidad de la cual forman parte

67. Finalmente, queremos señalar, las implicaciones de la dinámica de la población sobre un aspecto que en la sociedad latinoamericana se considera imprescindible para tener acceso al quehacer cultural y político de cada país. Nos referimos a la educación, considerada como la llave que abre las puertas de la cultura y que permite al hombre acceder a su condición de ciudadano. (En muchos países latinoamericanos el derecho a la ciudadanía les está negado a los analfabetos.)

68 Ahora bien, independientemente de los costos y plazos que implica, la creencia muy difundida acerca de la potencialidad de la educación para permitir el acceso al trabajo y por ende a la participación social, está fuertemente cuestionada al comprobarse que en estos últimos 20 años han aumentado los requisitos para postular a los mismos empleos de antes, sin que ello signifique una mejora en la condición económica y social que tal empleo otorga.

69 Es innegable que esa valoración de la educación como condición de progreso personal en la sociedad ha estimulado a una gran proporción de la población latinoamericana a extender lo más posible su educación formal Incluso, se sabe que la proporción de estudiantes universitarios en América Latina es mayor que en otras partes del mundo desarrollado Esto ha llevado a la situación paradójica de que en una región que no se reconoce como de las más adelantadas hay una plétora de personas con educación avanzada que buscan trabajo.

70. Es interesante anotar que se ha recurrido al expediente de aumentar los requisitos para paliar la enorme demanda de empleo por parte de una población cada día más numerosa en busca de trabajo, y poder así justificar el empleo de unos pocos e incluso [illegible] despido de muchos.

71. Estas comprobaciones ponen pues en tela d[e] juicio y cada vez más radicalmente la concepción d[e] la educación como transmisión de un acervo cultur[al] acumulado, y más bien exigen plantear el hecho educa[]tivo a nivel de una actitud crítica del educando fren[te] al mundo que lo rodea.

72. Pero no sólo el aumento de población tien[e] implicaciones en el hecho cultural, sino que tambié[n] el fenómeno migratorio tiene innegables relaciones co[n] él. En este caso se trata de las migraciones del camp[o] a la ciudad Los datos sobre la creciente urbanizació[n] de los países latinoamericanos nos muestran que la[s] ciudades más importantes han aumentado numérica[]mente su dimensión en razón de la migración masiv[a] rural. En algunos casos la población urbana nativ[a] representa apenas entre un cuarto o un tercio del tota[l]

73. La población rural al migrar masivamente a l[a] ciudad encuentra con sus comprovincianos ocasión d[e] revivir en la ciudad sus costumbres nativas y de cultiva[r] con especial añoranza el arte folklórico de su regió[n] La ciudad se ve inundada de este acervo popular, e[l] cual es paulatinamente asimilado y valorado por lo[s] medios culturales urbanos Podemos ver incluso e[n] esta nueva valoración de aspectos culturales prove[]nientes de los sectores mayoritarios, cierta forma d[e] oposición al carácter selecto de la creación cultural tan generalizado en las sociedades latinoamericanas, [y] que significa por lo mismo la relatividad de la educa[]ción formal como condición para estar en capacida[d] de dicha creación

74 Son también los grupos migrantes ubicados e[n] las zonas marginales de las grandes ciudades los qu[e] aún precariamente se organizan en forma comunitari[a] a fin de resolver sus problemas urgentes de acondicio[]namiento ambiental, crean de esta manera formas d[e] participación directa en los asuntos cívicos, y está[n] igualmente dispuestos a una participación política d[e] mayor aliento

75 Resumiendo, podemos percibir a través de lo[s] aspectos delineados tanto en las relaciones laborale[s] como en las comunales y en las manifestaciones folkló[]ricas, de amplios sectores de la población, como s[e] opera un descubrimiento de sus propios valores y d[e] su capacidad de participación en la toma de decisione[s] sobre los asuntos que les conciernen, y esto bajo l[a] presión de fenómenos de población

76. Las diversas manifestaciones que hemos revisado en forma suscinta, corresponden en definitiva a una aspiración fundamental de las poblaciones a ejerce[r] el derecho de decidir sobre su propio destino y d[e] participar en su construcción Esta es la razón de l[a] búsqueda de formas democráticas nuevas y tal ve[z] informales y su perspectiva política

POPULATION AND HUMAN RIGHTS IN LATIN AMERICA: SELECTED ISSUES *

Economic Commission for Latin America

1. All human rights refer to the "population"—the human race—but for present purposes it is not helpful to approach the theme in such all-inclusive terms. In this paper attention is focused on rights relating to two demographic variables—fertility and spatial distribution—and on two kinds of rights—the right to receive services and the right to self-determination or self-defense against dictation from society or the state. A good deal of the discussion concerning these two rights is also relevant to rights bearing on the third main demographic variable, mortality—that is, on the preservation of life—but consensus on the latter is more pronounced and more deeply rooted in universally accepted human values than are the rights relating to fertility and spatial movements of population.

2. A proliferation of formal guarantees of human rights, enshrined in international declarations and in national constitutions, has proceeded, in semi-isolation, from development planning and policy formulation, on the one hand, and from the continual, unplanned accretion of laws, regulations, bureaucratic mechanisms and public resource allocations responding to short-term needs and particularistic pressures, on the other. Development planners, for the most part, have treated the "rights" as non-binding expressions of good intentions, even when they have done their best to plan for the rapid expansion of educational, health and other social services. Politicians and administrators, struggling to cope with immediate problems, have paid only intermittent attention to the differing general principles urged on them by human rights proponents and planners. Recent governmental endorsements of "integrated development" and "human development" indicate an intention of bringing the different strands of policy-making into closer harmony, but the practical consequences and means of acting on this intention have not yet been spelt out. [1]

3. The formulation and implementation of policies directed towards developing or safeguarding human rights take place in stratified national societies in which incomes, access to employment, access to public services and capacity to participate in decision-making are very unevenly distributed and in which the public sectors lack the financial and administrative resources needed to meet their commitments for promotion of development and social justice. Consequently, rights that are universal in principle are observed in proportion to the awareness of different classes or interest-groups of the relevance of these rights to their own situations and in proportion to their capacity to exert organized pressure for their observance. Arguments based on "rights" become weapons of different groups to strengthen their claims to a larger share of public resources that cannot be stretched thin enough to satisfy all claims. The State confronts an incessant clamour from interest-groups and localities demanding that it "solve their problems" as a matter of right. [2]

4. Within prevailing patterns of social stratification, with large parts of the population living in poverty and participating only "marginally" if at all in the political process, policy formulation and implementation take on élitist traits that are particularly significant in the case of policies bearing on reproductive behaviour and migratory movements. The minorities that participate in decision-making interpret these factors, as they manifest themselves in the masses, in terms of their own views of national development priorities and family welfare, and in terms of standardized solutions that can be applied to large numbers of people so as to produce changes that will show up in statistical indicators. The underlying interpretations are very diverse. They lead different sectors of opinion to look favourably on high fertility or low fertility, and on rapid urbanization or stabilization of the rural population on the land. The wide differences in real circumstances of the countries of the region justify the differing views to some extent, but differences in ideological premises are probably a more important factor. Whatever the population objectives that are advanced, the articulate minorities are predisposed to view the masses as pawns in a strategy for development, revolution or maintenance of the existing order. It is hard for the planners and ideologists to descend from global theorizing and strategy-making concerning the

* The original text of this paper (E/CONF.60/SYM.IV/12) was submitted to the Symposium on Population and Human Rights, Amsterdam, 21-29 January 1974.

[1] "Latin America and the International Development Strategy: First Regional Appraisal" (E/CN.12/947/Rev.1), chap. I; and *The Quito Appraisal:* A review, adopted at the fifteenth session of the United Nations Economic Commission for Latin America as resolution 320 (XV), of the progress made in the first two years of the International Development Strategy.

[2] "The State, particularly in its socially motivated activities, comes to resemble a harassed nursemaid trying to meet all the needs and regulate all the activities of its children, too overwhelmed by the multiplicity of its tasks to judge which deserve priority, which are beyond its current abilities, and which are not worth doing at all". *Social Change and Social Development Policy in Latin America* (United Nations publication, Sales No.: E.70.II.G.3), p. 9.

"role of population in development" or the "role of population in revolutionary change" to the real needs and choices confronting millions of individuals and families, which should be the focus of a "human rights" contribution to population policy.

FERTILITY AND FAMILY PLANNING

5. In the numerous international and national declarations of rights that have been endorsed during the past two decades, rights to receive services from the State have been spelt out in particular detail—rights to universal schooling, health care, social security, housing and nutrition. More recently, internationally influential sectors of opinion have insisted on the right of the family to decide on the number and spacing of children and on the duty of the State to provide family planning services enabling it to act on this information. As far as the dominant sectors of opinion in Latin America are concerned, endorsement of this "right" has been a good deal more grudging and conditioned by suspicion of the motives of its proponents than in most other parts of the world, but by now most of the Governments have accepted the first clause, if not the second

6. The growing international insistence on the right to family planning services has two different aspects: the straightforward endorsement of a right of access to a service contributing to family welfare and self-determination, and the expectation that governmental acceptance of the duty to provide family planning services to the whole population will further the broader objective of reducing rates of population increase.[3] While agreement or disagreement with this expectation does not affect the validity of the right, it has a good deal to do with the relative importance attributed to it.

7. It has already been suggested that the publicly endorsed "universal" rights to services in most Latin American countries are not universally and equitably honoured, for lack of public resources, lack of administrative capacity to use them efficiently and the relative incapacity of the neediest strata of the population to articulate forceful and realistic demands. When a new right calling for allocation of scarce public resources is admitted, it must enter into competition, subject itself to tests in relation to wider development objectives and struggle against the pressures making for distortion of distribution and content to which all social and infrastructural services are subject. What priority is it to have in relation to a number of older established rights that are not fully honoured? Is the social demand for it so strong that immediate large-scale implementation is politically expedient? Is the provision of the service, under conditions of high fertility, a prerequisite of the realization of other human rights? Is the State justified, from the standpoint of its over-all objectives and priorities, in not only furnishing services to the groups actively demanding them, but in campaigning to bring the problem and the services to larger groups that are unaware or apathetic? If it chooses the latter alternative, is the State administratively capable of meeting the full potential demand? It can be argued that the availability of external resources earmarked for family planning exempts this service to a large extent from the need to compete with other social services for domestic resources, but Governments can scarcely accept the implied dependency in such a delicate area of national policy

8. The social demand for family planning is undoubtedly on the increase, but it is a long way from the universality of demands for educational and health services. During the coming decade, pressures from the urban population for free family planning services are bound to become stronger, but if the public agencies simply respond to the demand without anticipating or stimulating it, access to such services will not become universal for a long time, and, as in the case of other social services, the rural population will be served last and least As long as the "human rights" case is not fortified by governmental conviction that lower rates of population growth are essential to development, and that family planning programmes can be an effective means of lowering them, the programmes can expect only modest shares of public resources. There is as yet no firm consensus either in governmental circles or in general public opinion on the role of population increase in development, although the weight of opinion seems to be swinging towards advocacy of lower rates of increase. The differences in national situations are so wide that it cannot be demonstrated that population increase plays the same role or calls for the same kind of public action throughout the region

9. For the present, the strongest part of the case for active State promotion of family planning information and services as a right is linked to redistributive policy. In typical national situations of uneven modernization, the more affluent of the population already have access to family planning, whether the State approves or not, while the low-income masses that can least afford large families have little or no access, nor, in the case of most of the rural population, even an awareness of the possibility of fertility regulation.[4] This argument is stronger on paper, however, than as a determinant in public resource allocation.

[3] Resolution XVIII on human rights aspects of family planning adopted by the International Conference on Human Rights in May 1968, like several other international declarations on population questions, juxtaposes an observation on rapid population growth as "impairing the full realization of human rights" with an affirmation of the basic human right of couples "to decide freely and responsibly the number and spacing of their children and to adequate education and information in this respect" (*Final Act of the International Conference on Human Rights* (United Nations publication, Sales No E 68.XIV.2)) Such declarations have not posed the problem of a possible clash between human rights objectives if, as has been argued, family planning based on free decisions does not prove an effective means of slowing population increase

[4] Economic Commission for Latin America, "Population and modernization in Latin America", *Population Debate*, vol I, part four; and "Population Trends and Policy Alternatives in Latin America", *Economic Bulletin for Latin America*, vol XVI, No 1, 1971 (United Nations publication, Sales No: E.71.II G.5), pp 71-103.

10. The conventional formulation of the "right" here being discussed—the right of the couple or of the woman alone to decide freely on the number of children wanted and to act effectively on the decision—implies a right to reject family planning or to use the service so as to have more children rather than fewer, even if the State is determined to reduce the rate of population increase and even if it is objectively evident that additional children will be disastrous for the family's welfare. (Conversely, of course, the formulation implies a right to practise contraception even if public policy favours rapid population increase.) At this point, the definition of "rights" and "duties" becomes more complicated. Does the family or the individual really have a right to unlimited reproduction, if it is demonstrable that this will be harmful to the interests of society and will damage the life chances of all the children of the family? If not, what can society do about it? If compulsion is ruled out as neither legitimate nor practicable, to what extent is the State justified in using incentives, penalties and tactics of indoctrination? These questions have been little discussed in the Latin American context, except in the form of rhetorical rejections of any interference in free choice, and they have not had much practical importance, in view of the lack of consensus on population policy objectives and the weakness of the State in implementing any complex policy designed to achieve societal change. The State already intervenes in family life in many ways—through marriage and divorce laws, compulsory education, tax policies, social security etc.—and has converted certain "rights" into obligations. Once a sufficient degree of public consensus is reached concerning desirable fertility levels, it would be absurd to expect society to renounce all tactics designed to exert pressure on the decisions of families or women. The trouble is that the range of tactics meeting the combined criteria of legitimacy in terms of values, public receptivity, public administrative capacities and reasonable unit costs is not promising. Promotional campaigns would be essential, but the capacity of the State in most countries of the region to mobilize the masses of the population behind determined developmental objectives is low and is likely to be overtaxed by campaigns having other, more pressing objectives. Proposals for penalties on large families, through taxes, deprivation of public services etc., would be unacceptable in terms of rights and unenforceable in situations of mass poverty, in which many families cannot pay taxes and receive scarcely any services from the State. Financial inducements for smaller families would be prohibitively costly, hard to administer on a relevant scale and in all probability politically impracticable.

11. Although the question of the right to use or reject family planning services is thus far not very relevant at the societal level, because of the lack of coherent policies and lack of capacity to apply compulsion, it is already acquiring some importance to individual women through the extension of family planning within maternal health services. These services commonly attempt to introduce women to the desirability of using contraception or undergoing sterilization at a time when they are likely to be most receptive—immediately after childbirth. If the personnel of the services are convinced of the necessity of limiting the number of children in low-income families or of reducing population increase rates in general, and if their relations with clients partake of the usual feelings of middle-class paternalism and professional authority towards the lower class and the "ignorant", the woman's right to make a free decision on the basis of informed understanding of the alternatives is likely to get short shrift. Recent controversies in certain high-income countries and also in India concerning the requirement of sterilization as a condition for receipt of public assistance or hospital care point to an abuse that can become more serious to the extent that official and professional opinion becomes more assured of the necessity of fertility regulation. Such abuses cannot be obviated altogether by legal protection of the woman's rights as long as the current traits of social stratification do not undergo far-reaching changes. They are one aspect of a much wider problem. Relations between the "marginalized" masses and the official or private sources of aid and professional services are a contradictory mixture of resigned dependency, the quest for a "patrón" capable of eliciting benefits from the authorities, demands backed up by what has been labelled "representational violence" (demonstrations, seizure of public buildings, blocking of highways etc.) and wholesale rejection of the tutelage of a public order in which the masses have no effective voice. It is obviously desirable that couples and women needing family planning services participate in an organized way in the planning and delivery of the services, but this desideratum requires major advances in a more general struggle for informed participation by the masses in the decisions that affect them.

12. The tension between the right to receive services, the right to self-determination in their use and the State's interpretation of the best interests of the society takes a different form in the case of abortion. The known facts on the incidence of illegal abortions in Latin America indicate an enormous demand on the part of urban women from all social strata, a demand unlikely to be entirely obviated by family planning services, since women motivated to practice contraception would continue to seek remedies for lapses or failures. The demand for legalized abortion as a right, spurred by women's movements in other regions, has barely touched Latin America as yet, however, and would undoubtedly encounter formidable societal resistance. The proponents of family planning as a human right appear to have avoided the question for tactical reasons. [5]

[5] "No government representative appears to have characterized voluntary abortion as a 'human right' ... Given these views, it is unlikely to be fruitful to take up the issue in the early stages of developing the family planning right", Daniel G. Partan, *Population in the United Nations System: Developing the Legal Capacity and Programs of UN Agencies*, Law and Population Book Series Number 3 (Durham, North Carolina, Rule of Law Press, 1973), p. 28.

13. Various proposals have been made outside Latin America by crusaders for "zero growth rates" concerning the mass application of techniques of fertility control that would altogether rule out free choice—e.g., the dissemination of sterilizing agents through food or water supplies. For the immediate future, fortunately, Latin American Governments will have neither the will nor the capacity to apply such techniques of "population engineering". If the techniques themselves, however, become easier to apply and if in the future Governments should be seized with a conviction of desperate urgency in the slowing down of population growth, entirely new questions of rights and values would have to be confronted. Would the right of the family to decide on the number of children then be judged a luxury that society cannot afford? If the technique were applied equitably to the whole of the population would it be an interference with basic rights of a different order than, say, compulsory vaccination or fluoridation of drinking water?

Spatial distribution, migration, environmental protection and resource exploitation

14. The bearing of human rights on fertility control has been the subject of a great deal of polemical and hortatory literature The bearing of human rights on spatial movements of people and settlement patterns has, in some of its aspects—particularly that of migrations across national boundaries—also been extensively discussed, but it has received much less attention as a broad problem area, the contours of which are bound to change with rapid population increase and spatial concentration. The subject will come increasingly to the fore, in the two aspects of rights to receive services and rights to self-defense against societal dictation, to the extent to which development policies, which have thus far practically disregarded the spatial dimension, strive to incorporate objectives relating to human settlement, geographical distribution of economic activities, husbanding of natural resources and preservation of an ecological balance.

15. It is now generally accepted that current patterns and trends of spatial distribution of population and land use have many disadvantages for development and human welfare. With relatively sparse populations, most of the Latin American countries combine the ills of excessive concentration in huge urban agglomerations, soil exhaustion and excess labour force in the older agricultural zones and destruction of soils and forests in thinly settled zones now in process of occupation. As national population density increases and the consumption level rises, these problems are exacerbated Elaborate regulation of population behaviour and movements become unavoidable to ensure that millions of unco-ordinated individual and group actions shall not add up to irreparable damage to the long-term interests of the society as a whole. Thus far, consensus on the role of spatial distribution of population in development has been insufficient to serve as frame of reference for comprehensive policies bearing on distribution patterns. National policies commonly favour a slowing of the growth of the largest cities, discouragement of out-migration from rural localities and small towns and planned colonization of zones hitherto empty of population. (Concrete actions in pursuit of these policies have been piecemeal and generally offset by other measures stimulating continued concentration) The more realistic policy formulations do not call for a sharp reversal of trends, but for changes in proportions: the larger cities will continue to grow, but, it is hoped, more slowly; the rural areas will not absorb the whole of their natural increase, but it is hoped, a larger share; the zones of colonization will not be occupied in a disorderly flood of people, but, it is hoped, at the pace at which infrastructural investments can be afforded and destruction of natural resources minimized It is hoped that the propensity of the population to migrate will respond to a combination of moderate incentives and disincentives.

16. However, if the population continues to grow at current rates while traditional ways of livelihood lose viability and the increasing dominance of urban markets and consumption patterns make the whole population more homogeneous culturally and more mobile, this response cannot be counted on, even if public measures become more consistent and better planned than heretofore. To what extent is the State then justified in interfering with the rights of persons to live where they want and as they want? To what extent is it capable of doing so effectively and equitably? The State already possesses some legal instruments adaptable to this purpose. Their use for control of population movements has heretofore been limited by the low priority given to spatial distribution objectives by the dominant forces in the Governments, on the one hand, and by the capacity of the groups affected to defend their immediate interests by various tactics of pressure or evasion, on the other.

17. Such tactics as those described below are relevant, but all of them present short-comings in terms of feasibility and legitimacy in the prevailing real situations

18 The State can deliberately refrain from allocations expanding the supply of housing, jobs and social services in urban centres that are judged over-populated As the larger cities are invariably favoured over the remainder of the population in such allocations, the apparent denial of "rights" might really be a step towards more even treatment for the population as a whole. However, the population of the larger cities normally has a more widely diffused consciousness of rights vis-à-vis the State and greater capacity to exert organized pressures than the remainder of the population, so that the political viability of a policy of this kind is questionable, while the economic viability would depend upon a simultaneous transformation of structures of production and distribution

19. The State can introduce systems of job permits and residential permits for the urban population, making it an offence for migrants to stay in the cities without such permits. Measures of this kind are nown ' er

parts of the world, and current systems of identification documents offer a readily available administrative framework. However, the use of a system of permits to control migration to the cities would require a more efficient and incorruptible administration than can be expected in most national situations. In practice, the impact on the rate of city growth would probably be small, and the main result would be to place part of the urban population—in general, the poorest and most marginalized strata—in a situation of illegality, exposed to job discrimination and exactions from the police. Even the current systems of identity documents and social security records, as they are applied to population groups with little education or awareness of legal rights, lend themselves to abuses.

20. The State can, representing the interests of the society as a whole, prohibit residence in certain zones or under certain substandard conditions, and evict the population involved. This legal power has commonly been used for the clearance of urban slums and shantytowns and for the eviction of rural settlements in the way of dam-building projects. It has also been used to some extent to prevent rural land use that is judged excessively destructive of soils and forests—cultivation of erodable slopes, goat grazing, charcoal burning. The compulsory resettlement of rural groups that are too sparsely settled to be reached by educational and health services and by police action is sometimes also attempted, particularly in the case of forest-dwelling Indian tribes, and in zones in which the authorities are determined to prevent contact between peasants and guerrilla movements.

21. Such interventions in human settlement, while limited in scope and haphazard in objective, have accumulated a deplorable record of unilateral action, unfulfilled promises and bureaucratic incapacity to envisage the impact on human lives of "progressive measures". Cultivators displaced by dams have, at best, faced long delays in receiving promised compensation or equivalent land grants; shantytown dwellers whose settlements have been eradicated have commonly either been left to fend for themselves or have been herded into public housing inaccessible to their sources of employment. Marginal peasants for whom goats represent the only form of capital and source of cash income have sometimes been forbidden to keep goats without the offer of any compensatory source of livelihood. In many cases, the groups confronted by such measures have been able to defend themselves in one way or another; but the defensive tactics naturally focus on immediately perceived interests and, if successful, leave the real damages to society—including themselves—to be perpetuated.

22. The State can direct urban groups to planned residential areas or new towns and rural groups to zones of agricultural colonization. Legally obligatory eradication of individuals and families, as a policy instrument for spatial redistribution of population, is hardly conceivable in Latin America; but semi-compulsion has occasionally been attained by removing families from their previous homes and leaving them no practicable alternative to acceptance of space in a housing project or colonization scheme. Measures of this kind are unacceptable in terms of human rights and experience indicates that they are also ineffective and prohibitively high in financial costs per family resettled. "Planned" paternalistic resettlement schemes in Latin America have a consistent record of failure.

23. In spite on the drawbacks and dangers of policy instruments such as those described above, it is to be expected that as state responsibilities for development widen and population increase intensifies existing problems, a great deal of interference with the preferences and free choices of individuals, families and local groups will be unavoidable. From a developmental point of view, the justification of such measures will depend upon their coherence and consistency with the style of development desired and upon their capacity to contribute significantly to national objectives at bearable costs. It is obviously absurd for the State to interfere with the choices of the people concerning residence and livelihood through measures that are at cross-purposes with one another, that commit major resources to accomplish minor objectives or that exempt the powerful whose activities bring about the more serious environmental damages. From a human rights point of view, the justification for such measures will depend upon the capacity of the State to apply them equitably and in full consultation with the groups affected, to seek a sympathetic understanding of the full human implications of the measures being considered and, above all, to respect its obligation to provide opportunities for livelihood and human relationships that are equivalent to or better than those of which the group is being deprived. Ideally, the group affected should gain through the process of change itself in its capacity to understand and defend in an organized way its own interests, long term as well as immediate, and to relate these interests to a coherent interpretation of the interests of the wider society. The remarks made in the preceding section concerning the difficulty of attaining authentic popular participation in decision-making in societies with prevailing relationships between bureaucracies and professionals, on the one hand, and the masses of the population, on the other, obviously apply also to measures bearing on spatial distribution, environmental protection and resource use.

24. The discussion up to this point has centred on issues that arise within Latin American national societies. It is well known that population increase and spatial mobility, interacting with political upheavals and unevenly distributed economic growth, are generating, on a rising scale, several kinds of population movements across national frontiers which raise issues of human rights.

25. Where job opportunities and wage levels, or access to land for cultivation, differ widely on the two sides of a frontier, migrants—mainly originating in the

underemployed rural population—cross from the less promising to the more promising country. Until recently, such migratory currents were on a modest scale and were tolerated or welcomed by the authorities of the recipient countries as sources of cheap labour, particularly for seasonal agricultural work. At this stage, the principal human rights issues relate to exploitation of the migrant workers, usually with even less access to social services, social security, protective legislation or union organization than the rural citizens of the recipient countries With the increase of national population, the scale of such migrations has grown and receptivity has dwindled. Migration of unskilled workers to countries outside Latin America, previously of considerable importance to Mexico and some Caribbean countries, has been practically cut off or deprived of legality. Within the more affluent Latin American countries, the national labour force, itself rapidly expanding and suffering from insufficient employment, becomes more resistant to low-wage competition from abroad The concentration of alien agricultural workers and squatter-cultivators in thinly populated frontier zones excites preoccupations over national security. In some of the large cities, the growth of slums and shantytowns populated mainly by alien migrants occasions prejudice, sometimes with racial overtones. Since large parts of the populations of the countries of emigration are desperately poor, with dwindling capacity to survive by subsistence agriculture and seasonal wage labour, and frontiers are long and practically unguardable, the recipient countries cannot cut off such migration at the border. Attempts to hunt down and deport the migrants who have slipped through, under prevailing conditions in the frontier zones, are bound to involve arbitrariness and brutality, followed by resentment in the country of emigration Thus far, this kind of problem has occasioned protracted negotiations and a few violent confrontations between individual countries. More effective regional recognition of the rights of illegal migrants as human beings is needed, but as long as prevailing styles of development continue to generate an excess of labour, underemployed or in low-productivity occupations, a "human rights" approach to this problem can hardly amount to more than a treatment of symptoms.

26 The plurality of political régimes in Latin America, the occasional violent shifts from one kind of régime to another, the emergence of developmental strategies that clash with status expectations, property holdings and consumption patterns of certain social classes and groups, and also the growth of movements that reject the existing order in favour of revolutionary or terrorist action, is generating on an unprecedented scale, movements of refugees, exiles and voluntary migrants motivated by insecurity, deprivation of previous source of livelihood, or rejection of the personal consequences of the prevailing national development strategy. While the migrants discussed above come mainly from the poorest strata of the population, migrants in the second category, whatever their political complexion, come mainly from the middle and upper strata, are relatively well-educated and include important proportions of professionals, university students and would-be *entrepreneurs* The Latin American countries have well-established norms concerning the rights and obligations of political exiles, but once politically motivated movements across national frontiers become large scale and heterogeneous, such norms become hard to apply and irrelevant to some of the real problems. The first category of migrants poses the basic issue of rights to minimum livelihood and human dignity. The second category poses a wide range of more specific issues with which the individual countries are likely to be grappling for a long time to come: rights of alien professionals to practice their professions, rights of students to finish their education, rights of aliens with capital to compete with local enterprises; rights of exiles to act on their political beliefs. In the nature of things, middle-class migrants are in a better position to make themselves heard, to grapple with regulation and to take advantage of services than are the others

Concluding note

27. The present paper does not offer "solutions" to the problems it poses, and the forbearance is deliberate. It would be ingenuous for a brief survey covering a region of great internal diversity to pretend to offer universal practical recipes for the treatment of symptoms of basic maladjustments in the processes of economic growth and social change, or to propose additions to the innumerable guarantees of rights in laws and constitutions. The dominant forces in the various national societies are now trying to deal both with the symptoms and with the underlying causative factors, guided by widely differing conceptions of the nature of development and of priorities for human welfare, constrained by widely differing combinations of pressures and sources of political backing, always confronting "a flood of generalized advice . so voluminous and heterogeneous as to overstrain their capacity to digest and choose" [6] The present paper has outlined some of the requisites of choices, giving due weight to human rights within policies bearing on fertility and spatial movements of population, and some of the measures that have been proposed or applied, trying to suggest the complexity of the issues and the inapplicability of simplified and universalized prescriptions The choices that emerge must strive to reconcile different values and development objectives, all legitimate in themselves, presenting themselves differently in each national society, none attainable in full in societies struggling to cope with current processes of growth and change.

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[6] "Report on a unified approach to development analysis and planning: preliminary report of the Secretary-General" (E/CN.5/477), para 3.

POPULATION AND HUMAN RIGHTS IN AFRICA *

Economic Commission for Africa

1. The discussion of human rights in relation to population questions in Africa cannot be divorced from the general consideration of the meaning and implication of human rights in all other spheres of human life and development. The context of the discussion has to be related to the wider perception of human rights as portraying those inherent and fundamental values which, in general, underlie all domestic and international laws, conventions, treaties, convenants and resolutions.

2. Within the framework of development in Africa, the expression of human rights is ensured through the promulgation of laws and regulations affecting the rights and privileges of persons in their self-development. Further, articulation of human rights by Governments is also reflected in the development plans of various African countries. Indeed, the basic rights constitute the foundation on which the approach and the underlying philosophy of social and economic planning are based.

3. In the current scheme of things in development in Africa, important population issues requiring close examination of the implications of human rights are many. These issues include: welfare of children, youths, the aged and women; operation and regulation of the levels and patterns of fertility; mortality, morbidity and migration, internal as well as external, including refugee movements; family welfare and marriage; problems of employment, wages, equal pay and just working-hours; access to adequate education and means for cultural expression and identity; and problems of family planning in relation to mother and child care.

4. All these issues find expression in different national and international instruments. The major international instruments, such as the United Nations Charter and the Universal Declaration of Human Rights, are widely recognized and have their underlying principles and values inculcated in other less universal instruments of human rights. Particular instruments such as specific United Nations General Assembly resolutions, treaties, conventions, resolutions adopted at various meetings of the United Nations Economic Commission for Africa (ECA) on population, national laws and regulations, which will be referred to later in this paper, have similar value-reference points as the more universally applicable instruments. If anything, the specific instruments represent the articulation of the universal codes and values to particular situations. The instruments to be invoked in the presentation will depend upon their relevance to any of the broad population issues to be dealt with.

Relationship between human rights and fertility

5. Within the framework of the generally prevailing high level of fertility and the frequency of births in relation to family formation (marriage) and maternal health and child care, concern for human rights has been expressed under various auspices by Governments and organizations in Africa. Deserving special attention are those rights related to marriage and the family and to the "right to decide freely and responsibly on the number and spacing of children".

Rights relating to marriage and the family

6. Africans of full age traditionally exercise the right to marry freely and to establish families within their local communities and within the provisions of their respective cultural and legal norms. The laws, religion and culture of each individual country define the legal status of marriage. Fundamentally, the norms agree on the freedom to marry and found families without any limitations due to race, nationality or religion, in the manner upheld in the Universal Declaration of Human Rights. [1] Despite this universal desire to encourage marriage, however, there are usually traditional expectations that marriages should be contracted between families belonging to the same ethnic group. In some communities, the traditional expectation is that the families should preferably come from the same local community. Consequently, intertribal and interracial marriages usually find disfavour, but are not rejected if already contracted. Increasingly, such marriages are occurring among educated Africans in the cities and among those who have travelled abroad for further education. Persons involved in such marriages find themselves no longer under the control of kinsmen; and, being engulfed in broader and more heterogeneous relationships, choose their partners from outside their immediate local and traditional home areas. The important point here is that once contracted, and especially if blessed with children, such marriages are allowed to

* The original text of this paper (E/CONF.60/SYM.IV/13) was submitted to the Symposium on Population and Human Rights, Amsterdam, 21-29 January 1974.

[1] See art. 16, para. 1.

thrive mainly as a result of modernization and social change.

7. The one extreme form of the negation of the principle of free contract of marriage between people of different racial groups in the continent exists in South Africa, where such marriages are prohibited by law. That the law constitutes an affront to the freedom of choice and movement is clearly underlined by the fact that illicit affairs take place between the races.

8. The Universal Declaration of Human Rights is explicit with respect to the principle that marriage shall be entered into only with the free and full consent of the intending spouses [2] This is also another area where traditional expectations are being markedly eroded by the forces of social change, especially education and urbanization. Traditionally, early, universal and arranged marriages were common and were buttressed by various marital customs. There are now clear indications that in societies where these customs prevailed, signs of change were emerging. Many studies now show that the age at marriage is higher in urban areas and among educated and working-class females [3]

9. It should, however, be conceded that, as yet, many women have not received the benefits of education and working in the modern sector, and so the change has not permeated the rank and file It is, perhaps, in this spirit that the African Regional Meeting on the Role of Women in National Development in 1969 called for more rapid changes affecting the legal status of women. At the meeting, most participants agreed that girls can have husbands of their own choice, depending upon the type of marriage contracted [4] All delegates except one expressed disapproval of polygamy. It was also observed that there are still many countries where, at the death of the husband, the wife and all property and chattels of the deceased revert to his brother or to the next male heir (this does not necessarily impose co-habitation). This, however, excludes cases where husbands died intestate.[5] It was also observed that many countries of Africa had already established equal legal status for both sexes in all fields, the women being entitled to acquire property and to choose a profession.[6]

10. However, despite such legal recognitions, the meeting maintained that, with regard to cultural, traditional and religious practices, special efforts should be made by national authorities and women's organizations to review existing family legislation in order to achieve: a legal limit to the minimum age for marriage and the amount of dowry to be paid; the free choice of partners in marriage; and the legal protection of widows in every respect [7]

11. In general, several specific recommendations intended to enhance the legal status of women were made to Governments, institutions and international bodies concerning the role of women at home, in community and in national development; [8] the role of women in education, training and employment; [9] and the role of women in political, social and public life. [10] The significance of the points of view of this meeting cannot be underrated From 32 African countries, about 85 women with responsibilities in government and organizations participated in the meeting

Freedom and responsibility to decide number and spacing of children

12. The principles involved here recur in several documents of the United Nations and the Economic Commission for Africa (ECA) The Secretariats of the UN and ECA undertake the implementation of mandates received from States Members of both organizations, especially those arising from the sessions of the General Assembly and the Economic and Social Council, and of the Conference of Ministers of ECA

13. For the moment, mention should be made of two or three resolutions adopted in the period 1966-1972, which clearly deal with relevant mandates on population, family size and spacing of children. The first, General Assembly resolution 2211 (XXI) of 17 December 1966, recognized, *inter alia*, the sovereignty of nations in formulating and implementing their own population policies with due regard to the principle that the size of the family should be the free choice of each individual family. The second, General Assembly resolution 2542 (XXIV) of 11 December 1969, confirmed, among other things, that parents have the exclusive right to determine freely and responsibly the number and spacing of their children, and that provision of knowledge and means necessary to enable them to exercise that right should be made available to individuals. Also, the Economic and Social Council, by its resolution 1672 (LII), *inter alia*, urged upon States Members of the United Nations to give full attention to their demographic objectives and to co-operate in achieving substantial reduction of the rate of population growth in those countries which considered their current rate of growth too high, and to ensure, in accordance with their national policies and needs, that information and education about family planning, as well as the means to practice family planning effectively, should be

[2] See art 16, para 2.

[3] J C Caldwell, "Population general characteristics", in W. Birmingham and others, *A Study of Contemporary Ghana* (London, Allen and Unwin, 1967), vol II, pp 68 69, P. O Ohadike, "A demographic note on marriage, family, and family growth in Lagos, Nigeria", in J C Caldwell and

para 91.

[5] *Ibid*, para. 94

[6] *Ibid*, para 95

[7] *Idem.*

[8] *Ibid*, paras 96-104.

[9] *Ibid*, paras. 105-129

[10] *Ibid.*, paras 130-140

made available to all individuals by the end of the Second United Nations Development Decade.

14. Elaboration of the above-mentioned principles in the African context has been recommended by various bodies of ECA, including the African Population Conference, Accra, 9-18 December 1971, and the First Session of the Conference of African Demographers, Accra, 18-22 December 1971. Both bodies have recommended, among other things, that adequate attention, through studies and investigations, be given to fertility regulation, including high fertility as well as sub-fecundity and sterility prevailing in some parts of Africa. They also recommended that maternal and child health services should form a part of family planning programmes. [11] For programmes to be effective, they should involve all aspects of family life and welfare, including such relevant and desirable services as educational services and rural extension activities. [12]

15. In discussing the prospects of fertility levels and differentials in Africa, the Working Group which assembled at Addis Ababa, 18-22 December 1972, considered the relevance of family planning. It observed that while the approach of the countries to population policies could differ, depending upon the different characteristies of the population, the factor of population growth and its components—fertility, mortality and migration—should be brought into the mainstream of economic and social development. This consideration demanded that population problems also include problems of high fertility as well as the high incidence of sub-fecundity, sterility and infant and childhood mortality. [13]

16. The Working Group also considered that family planning should include the application of preventive medicine and that by doing so, infant mortality could be reduced, with the result that family planning programmes would be made more acceptable. The previously mentioned report of the meeting on the role of women in national development put these views succinctly:

> "The meeting recommended that family planning should be included as part of the normal and routine maternal and child-care work of the basic health services as well as in the educational, community and social welfare services. It was agreed that this was desirable in order to enable mothers to have children by choice rather than by chance, to help the infertile, to protect the health and welfare of mothers and their children and family, and to reduce the problem of repeated unwanted pregnancies, which invariably interfered with professional training, and effective participation in social, commercial, civic and cultural community life." [14]

17. In terms of responsibility, the Working Group stressed the need of individual couples in fostering family planning mainly in connexion with improving marital relationships. [15] That it should be "couples" and not "families" which should take responsibility in deciding to adopt family planning is, in the African context of extended family relations, significant. Part of the ethos upheld by extended families in Africa is the enlargement of their membership through having as many children as possible. In the context of modernization and technological change, couples, more than the extended family, are in a better position to appreciate the social, economic and moral responsibility of family planning.

18. Mention should also be made of the Regional Conference on Education, Vocational Training and Work Opportunities for Girls and Women in African Countries, held at Rabat, Morocco, 20-29 May 1971, under the joint sponsorship of ECA and the German Foundation for the Developing Countries. The Conference recommended that:

> "Family planning should be considered a supplementary activity of the maternal and child health centres and be promoted through the health services, health education services, community centres or social welfare services and that it should be adapted to the conditions and the needs of the country". [16]

19. It is interesting to examine the specific application of family planning rights in different countries of Africa in terms of policies, attitudes and the availability of the knowledge and means of obtaining family planning services, especially as reflected in African development plans and other sources.

20. Three broad categories with respect to the disposition of countries of Africa towards family planning were recently indicated at a meeting of ECA, which was held at Addis Ababa from 1 to 3 May 1973. [17] Briefly, and taking into account developments since the meeting, the first group (of about 18 countries) comprises those countries which do not officially promote family planning programmes; the second group (of about 15 countries) consists of those which currently do not have national policies but which have programmes run by voluntary agencies, with or without government support.

21. The third group is the most significant, comprising eight countries which have official population policies: Botswana, Egypt, Ghana, Kenya, Mauritius, Morocco, Swaziland and Tunisia. Presumably, Zaire has since moved into this group, for it is on record that the Government of Zaire, out of increasing concern for the

[11] "Report of the first session of the Conference of African Demographers" (E/CN.14/533), para. 86.

[12] *Ibid.*, para. 80.

[13] "Report of the Working Group on Fertility Levels and Differentials in Africa, and the prospects for the future" (E/CN.14/589), paras. 137-139.

[14] "Report of the Regional Meeting on the Role of Women...", para. 97.

[15] "Report of the Working Group on Fertility Levels...", para. 140.

[16] *Report of the Regional Conference on Education, Vocational Training and Work Opportunities for Girls and Women in African Countries* (Bonn, German Foundation for Developing Countries, 1972).

[17] "Background information" (on the Third Regional Inter-Agency Co-ordination Meeting on Population) (E/CN.14/POP/81/Rev.1), annex III, pp. 7-8.

health of the people, particularly mothers and children, has been promoting the principle of "desired births".[18]

22. In relative terms, the articulation of human rights, judged by the positions of the three groups indicated above, has been most effective among the group of 8 countries with official national programmes, for even they, too, have many active voluntary organizations working in the field of family planning. It has been shown, for instance, that the programmes in Tunisia, Mauritius and Egypt have been associated with some decline in fertility[19] In Tunisia, the crude birth rate dropped from 46 8 in 1960 to 36.2 in 1970; it declined from 43.0 in 1960 to 36 9 in 1969 in Egypt. The reduction in Mauritius has been most impressive, with the crude birth rate falling from 38 5 in 1960 to 26 0 in 1970. The change in fertility in Tunisia is, however, the combined effect of family planning and of the laws raising the age of females at marriage and abolishing polygamy.

23 In spite of the progress reported in some of the countries, doubts have, in general, been cast about the intensity and impact of many of the programmes run by Governments and voluntary agencies. One major criticism has been that most of the programmes are concentrated mainly in the urban areas, to the neglect of rural areas, which have not only higher fertility and most of the total national population, but also a poorer sanitary and health infrastructure In view of this [illegible]

[illegible]

wish to use them[20]

24. Other major criticisms by the Working Group dealt in general with the inadequacy of information and education about family planning. With respect to one problem, delegates urged that, in order to obviate some of the fears about the notion and practices of family planning, family-life education should be encouraged at all levels of the educational system. Such education will be necessary if the reported practice of induced and septic abortion, with its dangerous consequences, especially among young unmarried mothers, was to be checked.[21] In another respect, poor education and the side-effects of the methods used were blamed for the high drop-out attendance rates in various family-planning clinics. Delegates to the Working Group consequently called for adequate research by medical doctors before introducing certain methods[22]

25. On a more general note, the impact of programmes could be strengthened through co-ordinating and implementing measures with complementary effect on fertility and family size. A good example of such complementarity may be seen in the measures adopted and implemented in Tunisia. There, legislative action has been taken by the Government to limit family allowances for industrial workers to four children only, to prohibit polygamy and postpone the age at marriage; abortion is permitted when there are five or more living children, when there is a health hazard or when pregnancy occurs while using an intra-uterine device.[23]

26. Lastly, strategies should be worked out and action taken to effect changes in the status of women in order to ensure that they should fully exercise the right to decide freely and responsibly. Such actions should be geared to ensuring that the effective exercise of rights could ensure proper child-spacing and better family health and reduced fertility as desired goals of the right of family planning To this end, increased educational opportunities for women and increased female participation in wage employment will contribute to the changing attitudes among women towards family planning and population programmes The view is strongly held that if a woman finds it essential to limit the number of her children, she not only should be given the opportunity to do so, but should be given adequate education, a stable economy, a meaningful social standard and other fruits of a well-planned development Consequently, family programmes should not be proposed as alternatives to, or in isolation from, other social and economic development programmes[24]

27 On a more general note, a monolithic approach to policy formation, in view of the diversity of views and of the economic-demographic problems in Africa, should be eschewed While supporting policies designed to deal with the problems of rapid demographic growth, the reduction of subfecundity and relative sterility obtaining in some parts of Africa should also be given adequate attention The importance attached by some countries of Africa to this dual approach was evident during the deliberations and recommendations of African representatives at the fifth session of the Conference of African Demographers at Accra, Ghana, in December 1971 The delegates clearly endorsed programmes of fertility regulation, including high fertility, as well as subfecundity and sterility.[25]

Migration, population distribution and human rights

28. The principles that support freedom of movement, especially in relation to work and settlement where jobs are available, have been promoted and respected in varying degrees, depending upon the internal and external policies pursued by countries of

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[18] *African Population Newsletter*, No. 9 (May 1973), pp 23-24

[19] "Report of the Working Group on Fertility Levels...", para 18

[20] *Ibid*., para. 106

[21] *Ibid*, para 141

[22] *Ibid*, para 142

[23] S[illegible] lation [illegible] Afric[illegible] ation [illegible]

[24] "Family planning and the changing role of women", in Seminar on Family Life Education.

[25] "Conference of African Demographers...", paras. 79 and 86.

Africa. Fundamentally, the principles that "Everyone has the right to freedom of movement and residence within the borders of each state" [26] and that "Everyone has the right to leave any country, including his own, and to return to his country" [27] are promoted in the legal and policy instruments of many countries.

29. In addition to recognizing these rights of both internal and external migration, many countries of Africa have, by being party to conventions, protocols and agreements governing specific aspects of refugee problems, upheld the principles promulgated in articles 14 and 15 of the Universal Declaration of Human Rights concerning the status and protection of refugees.

30. However, notwithstanding the general recognition of the basic element of the principles, there are variations between countries in the specific application of the rights of free movement within and out of the borders of each State. Of special significance in this respect is the variation between the white-ruled countries of Africa and the independent African States. In the former, significant legal, social and economic constraints have been put in the way of the full assertion of rights for certain segments of the population. In the black independent States, questions of sovereignty and internal economic pressures have also modified the activation of the instruments that define the rights relevant to free movement, internal and external.

Internal migration, distribution and settlement

31. Nearly all the independent African countries have recently been experiencing rapid urbanization at a rate much higher than that obtaining in any other region of the world. In a number of major cities, the growth has been as high as 12 per cent per annum; while in a few others, rates as high as 15 per cent have been recorded. The major part of this growth has occurred because of the migration of young people from the rural to urban areas for an improved level of living, especially employment.

32. Whether all the rural migrants achieve their goals is a different issue. The fact that, for many countries, the crucial problem has been one of how to control the excessive in-flow of migrants in the face of an urban-infrastructure inadequate for survival merely confirms not only the existence in these countries of the right to move freely, but the fact that the countries are beginning or planning to apply brakes to this form of movement. The control, in the view of the Governments of many countries of Africa, is purely motivated by other human right considerations, including the right to a decent and good level of living, which eludes many rural migrants.

33. Governments of various countries of Africa have employed different measures in dealing with this problem of over-urbanization. Examples of policies reviewed during the Seminar on Statistics and Studies of Migration and Urbanization, Moscow, 11-22 September 1972, at which several African government representatives were present, throw immense light on the various postures adopted. As a rule, almost all the views expressed were in favour of spreading development projects throughout the entire country in order to promote balanced development between rural and urban areas. [28]

34. More specifically, the objectives of the various policies explained by the representatives are to develop agricultural settlements, create new jobs for the rural population, train youths for satisfactory rural settlement, reclaim marginal lands, breed livestook, implement rural electrification schemes and industrialization projects, provide low-cost housing in towns, build roads in rural areas, introduce national service schemes for graduates in rural areas, establish co-operative villages with mechanized agriculture and self-help schemes and introduce "site and service schemes" for building owner-occupied houses in low-income areas. [29] All these programmes have had varying degrees of success. Their effective implementation requires not only capital and effective administration, but the good will of nationals in accepting the measures as being in their best interest and as not infringing their freedom of movement and work anywhere in the country.

35. Actual infringement of the right to move, live and work where desired occurs largely in South Africa and in Namibia. Discriminative legislations that restrict the urban residence of Africans to certain demarcated zones have been promulgated and effected. Adult male workers have been restricted to definite and specified urban jobs. As a result of these policies, a breakdown of many families and many forms of social and economic deprivations of workers have taken place. [30] In terms of residence, no length of stay in an area would give a man permanent residence, even if he so desired. "Gathering all members of a group into designated area has meant uprooting and resettling hundreds of thousands of people in what surely must have been, and still is, one of the largest involuntary movements of peoples in modern times."[31] It is on record that the Seminar on Statistics and Studies of Migration and Urbanization condemned South Africa and such Territories as Angola, Mozambique and Southern Rhodesia for implementing restrictive and discriminatory policies. [32]

36. Quite recently, the inhuman use of forced labour in African territories under Portuguese domination was unanimously condemned at the Third Meeting of the Technical Committee of Experts, held at Addis Ababa

[26] Universal Declaration of Human Rights, art. 13, para. 1.
[27] *Ibid.*, art. 13, para. 2.

[28] "Report of the Seminar on Statistics and Studies of Migration and Urbanization" (E/CN.14/588), paras. 90-118.
[29] *Idem.*
[30] *Conséquences économiques et sociales des pratiques de discrimination raciale* (United Nations publication, Sales No. 63.II.K.1), paras. 224-269 and 385-401.
[31] William R. Frye, *In Whitest Africa: The Dynamics of Apartheid* (Englewood Cliffs, N.J., Prentice-Hall, 1968), p. 17.
[32] "Report of the Seminar on Statistics ...", para. 96.

from 2 to 8 September 1972 [33] At the same meeting, the Committee also unanimously condemned the shameless exploitation of, and profiteering from, the illicit and clandestine trafficking in African labour in France and other European countries Observing that, at the invitation of the Administrative Secretary-General of the Organization of African Unity (OAU), an intersecretariat committee of OAU, ECA and the International Labour Organisation (ILO) was currently sponsoring a field study of the problem, the Committee recommended that the investigations, while remaining an intersecretariat project, should be incorporated into the work programme of the Social Development Section of ECA [34]

International migration

37. Traditionally, and even after the advent of colonialism, the African has been on the move to lands far and near for trade, pilgrimage and adventure. In traversing and sojourning in any territory in the past, he was required to adapt to the rules and customs of the people of the area. In exchange for traditional courtesies, he was guaranteed saftey and protection.

38. After the advent of colonialism and the consequent Balkanization and partition of the continent by the Metropolitan Powers, a new dimension of recognition and protection was added. The traveller, in travelling to territories under a different Metropolitan Power, needed travel documents authenticated by the authorities in power in his home area Also, travel out of Africa to other continents not only became possible, but had to be supported with official travel documents.

39. Following the attainment of independence from the Metropolitan Powers, countries of Africa, conscious of and eager to assert their sovereignty, have imposed legal controls on the crossing of their borders In consequence, emigration and immigration, even between contiguous territories with related ethnic groups and common customs, have come under greater surveillance, although not without problems of over- and under-enumeration The relatively more accurate recording of movements have been only those which take place at the national air, sea and land terminals.

40. If the attainment of nationhood and the assertion of national sovereignty gave rise to immediate constraints on movements, the social and economic demands of nation-building have also led to new controls on immigration and residence. In many countries, there has been a cut-back in the number of immigrants entering for employment Thrust with the right of shaping their own destiny, the countries of Africa have been training and educating their own nationals, who have been displacing the immigrants One of the ways the Governments have ensured the supply of labour in fields where national supply has been inadequate has been by offering contract appointments and also by ensuring that prospective immigrants are issued work permits before entry into the country.

41. The preservation of jobs for nationals has led to some forms of discrimination against immigrant settlers or foreigners. A report presented to the African Population Conference at Accra, Ghana, 9-18 December 1971, sums up the situation thus·

"During the last two to three years many governments have had to expel large numbers of the foreigners living in their countries. Among the main reasons for these expulsions is the need to reserve jobs for nationals in order to reduce unemployment. Countries which have been foremost in the expulsion of foreigners for one reason or another are Ghana, Zaire Sierra Leone and Guinea. In addition to the policy, a number of countries have enacted laws which reserve certain jobs for their nationals only and have expelled foreigners from the reserved economic sectors Ghana, [illegible] residence permits of foreigners engaged in these jobs are usually not renewed when they expire Other countries which have recently enacted similar laws are Kenya and Uganda " [35]

42. Given a situation of rising unemployment in many countries of Africa, it will not be surprising if many more countries adopt a "closed-shop" policy, at least with respect to certain categories of jobs which tend to have a large segment of immigrant employees in them

43 As was indicated in connexion with internal migration, the white-ruled territories, especially South Africa, practice racial discrimination in formulating and implementing their international immigration policies Their policies have been conceived within, and guided by, the separate development policy of the Government. Within the *apartheid* system, non-whites have been unwelcome in South Africa, despite that country's tolerance, for purely economic reasons, of black immigrant labourers from neighbouring countries. Louis Dollot sums up the situation as follows·

"Les problèmes de contacts revêtent au contraire ici un caractère dramatique. Les Blancs représentent seulement 3,5 millions sur 18,7 millions d'habitants en 1968. La politique de ségrégation raciale des dirigeants Afrikaaners, descendants des anciens Boers, n'empêche pas cependant la venue, il est vrai, en général temporaire, d'une importante main-d'œuvre en provenance des territoires voisins, attirée par les hauts salaires, notamment dans les mines L'immigration, à la fois très sélective et très limitée, est cependant plus ouverte depuis quelques années." [36]

44 Although tolerated, the coloured immigrant workers are subjected to unfavourable and unjust condi-

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[33] "Report of the Third Meeting of the Technical Committee of Experts" (E/CN 14/571), paras 120-121

[34] *Ibid*, paras 120-121.

[illegible]

tions of work. They are not protected by any trade-union laws, as non-white unions are virtually prohibited. Like the bulk of the indigenous coloured persons, the coloured immigrant workers are subjected to all forms of racial discrimination. The right to residence and settlement is also denied, even to long-standing coloured immigrants. The Indian experience in Natal illustrates the South African attitude as follows: "L'Afrique du Sud, inquiète de l'accroissement des Indiens du Natal, a complètement fermé ses portes aux Indiens et a même tenté, en vain, d'en rapatrier un certain nombre . . ." [37]

Refugee movements

45. International population redistribution is not only related to the free movement of persons across national boundaries. It is also concerned with the forced migration of persons displaced by wars, revolution and other forms of social and political cataclysms. Such displaced persons often end up as refugees in places other than the land of their birth or nationality. The international community, on a purely humanitarian and non-political basis, has come to accept responsibility for protecting and caring for refugees.

46. Many acclaimed instruments, upon which the mutual recognition of, and approach to, refugee problems are based, exist. These are defined in international instruments and national laws through which legal protection is extended to refugees. By way of providing this protection on behalf of the international community, the United Nations High Commissioner for Refugees (UNHCR) has been promoting the conclusion and ratification of international conventions for the protection of refugees. Such international conventions invariably articulate and involve the basic principles expressed in article 14 of the Universal Declaration of Human Rights, especially the right of everyone to seek and to enjoy asylum from persecution.

47. The granting of asylum constitutes the most essential aspect of refugee work. A major international convention in the granting of asylum and protection to refugees is the Convention Relating to the Status of Refugees, of July 1951. This Convention provides for the granting of basic rights to refugees in their country of asylum, and lays down the minimum standards for their treatment and daily needs for survival and preservation of their human rights and personal dignity. But the Convention was limited in scope and coverage of events. It applied only to events that occurred before 1951 and also gave States the option of limiting its geographical applicability. There was, therefore, great need for improvement, which was furnished, in 1967, by the Protocol Relating to the Status of Refugees, which recently came into force and corrects the limitations of the 1951 Convention. Apart from the Convention and Protocol, there are many other instruments, too numerous to mention. [38]

[37] *Ibid.*, p. 88.

[38] United Nations High Commissioner for Refugees, *Collection of International Conventions, Agreements, and Other Texts Concerning Refugees* (Geneva, 1970).

48. The international instruments enjoin activities, not only within the legal field, but in the area of giving material assistance, especially those needed to make the refugees self-supporting and to enable them to rehabilitate themselves in the country of asylum. Without such assistance, the enjoyment of human rights by the refugees will not be easy. This is why the execution of such programmes of material assistance forms part of the activities of the High Commissioner.

49. In Africa, the work of the High Commissioner has been closely linked to developing new settlements in addition to provision of relief and such essential infrastructure as schools, water-supply, health facilities and roads. In all these activities, and in others, the High Commissioner draws upon the expertise of the organs and of the specialized agencies of the United Nations. The experiences of the United Nations Children's Fund (UNICEF) in child welfare, the Food and Agriculture Organization of the United Nations (FAO) in the choice of crops, the World Health Organization (WHO) in health services, the United Nations Educational, Scientific and Cultural Organization (UNESCO) in education, and the International Labour Organisation (ILO) in training, have been drawn upon in settling and rehabilitating refugees. The significance of such co-operation is better appreciated by examining the huge and expensive assistance and rehabilitation programme for Algerian refugees, [39] the return to south Sudan [40] and the recent continuation of the exodus from Burundi. [41]

50. States Members of the Organization of African Unity recognize the basic principles of human rights embodied is most of the international conventions and agreements. [42] The policies of these states have been clearly articulated in the OAU Convention concerning refugees, which was unanimously adopted at the Summit Meeting of Heads of State at Addis Ababa in 1969. The Convention, in its preamble, clearly takes cognizance of the provisions of other instruments, including the Charter of the United Nations, the Universal Declaration of Human Rights and various General Assembly resolutions affirming and reaffirming the principle that human beings shall enjoy fundamental rights and freedoms without discrimination. [43]

51. On the practical side, OAU has developed close relations with the United Nations High Commissioner for Refugees. In a resolution adopted in 1965, OAU had already called upon those of its member States not yet party to the 1951 Convention on the status of refugees

[39] United Nations High Commissioner for Refugees, *The Red Cross and the Refugees* (Geneva, 1963), pp. 23-30.

[40] "South Sudan: a joyful comeback", *UNHCR Bulletin*, No. 3, June 1973.

[41] "Burundi exodus continues", *UNHCR Bulletin*, No. 4, July 1973.

[42] United Nations High Commissioner for Refugees, "Background paper on the Office of the United Nations High Commissioner for Refugees" (HCR/85/71), p. 10.

[43] Organization of African Unity, "OAU Convention Concerning the Specific Aspects of Refugee Problems in Africa" (CM/267/Rev.1), *1969*, paras. 1-11.

to adhere to that instrument. Moreover, UNHCR and OAU signed an agreement on 13 June 1969, providing for close co-operation in all matters concerning refugees in Africa.[44] For example, UNHCR, *inter alia*, co-operates with the Bureau of the Placement and Education of Refugees, established at Addis Ababa within the framework of OAU, in solving the problems of African refugee students who seek resettlement opportunities in an African country other than that of their current residence, as well as for the growing number of refugees living in towns in Africa, many of whom are former civil servants, members of the liberal professions, merchants and so forth.[45]

52. The refugees in Africa are, in the main, assisted through local settlements, mostly in rural surroundings, through the co-operative effort of UNHCR and the Governments of the host countries The number of refugees of concern to UNHCR appears large, and speaks well of the efforts of the host countries, which apparently have other numerous development programmes. The relative responsibilities of some African countries towards refugees can be appreciated from some recently published data.

"At the beginning of 1971, the main refugee groups of concern to UNHCR in Africa totalled nearly one million and included the following 4,000 refugees (mainly from Angola) in Botswana; 40,000 (coming from the Democratic Republic of the Congo and Rwanda) in Burundi, 27,000 (coming from the Sudan as well as from the Democratic Republic of the Congo and Chad) in the Central African Republic; 490,000 (coming from Angola, Rwanda, Sudan and Zambia) in the Democratic Republic of the Congo; 21,000 (coming from Sudan) in Ethiopia; 67,000 (mostly from Portuguese Guinea, with a few hundred coming from other African countries) in Senegal, 61,000 (mostly from Ethiopia, plus 6,000 from the Democratic Republic of the Congo and a few hundred from Chad) in Sudan; 71,500 (mainly from Mozambique and Rwanda, with smaller groups coming from a number of other countries) in Tanzania; 180,000 (from Sudan, Rwanda and the Democratic Republic of the Congo) in Uganda; and 16,000 (mainly from Angola, Mozambique and Namibia) in Zambia. Moreover, UNHCR is concerned with some 6,000 refugees from various African countries at present living in a number of countries in West Africa (such as Cameroon, Dahomey, Gabon, Ghana, the Republic of Guinea, Ivory Coast, Liberia, Sierra Leone and Togo), as well as with 10,500 refugees to whom asylum was granted in various countries on the African continent, such as Algeria, the People's Republic of the Congo, Kenya, Lesotho, Morocco, Swaziland, Tunisia, and the United Arab Republic. Towards the end of 1970, the Governments of Gabon, the Ivory Coast and Nigeria jointly invited the UNHCR's good offices and technical assistance in facilitating the return home by way of an airlift of some 5,000 Nigerian children evacuated during the civil war in Nigeria. This operation was brought to a successful conclusion in February 1971."[46]

53. From available indications, the situation with respect to distribution of refugees by countries, as shown above for 1971, may not have altered dramatically. Some of the countries may have received more refugees as shown by provisional figures for 1972, which also shows that the total number dealt with by the UNHCR has exceeded the million mark.[47]

54 The individual's right to asylum suggests the need for the right to voluntary repatriation to the refugee's country of origin. Voluntary repatriation, apart from naturalization, is an important means of ridding the refugees of their status and giving them a nationality again Article V of the OAU Convention Governing the Specific Aspects of Refugee Problems in Africa clearly emphasizes the voluntary character of repatriation and the obligations of the country of origin in facilitating the settlement and the total rehabilitation of the returning persons without penalties for having left the country Major examples of the repossession of the nationality and protection of the country of origin include the repatriation, following the Evian Ceasefire Agreement of 18 March 1962, of 61,400 persons from Morocco and 120,000 from Tunisia to Algeria The co-operation of both the Tunisian and Moroccan Governments with UNHCR and the League of Red Cross and Red Crescent Societies was crucial to the success of that gigantic operation

55. More recently, following the end of 17 years of hostilities between the Sudanese Government and the former South Sudanese Anyanya movement, UNHCR co-ordinated all emergency relief within the Sudan in order to facilitate the return of 180,000 South Sudanese from Ethiopia, Uganda and Zaire. The emergency relief programme, covering the airlift of food and other essential supplies and equipment, was operated with the co-operation of the Sudanese Government and was extended to at least half a million other persons displaced during the conflict. To carry out the measures under the programme, UNHCR raised $20 million in cash and kind and also received the support of several international agencies and organizations.

HUMAN RIGHTS, MORBIDITY, MORTALITY AND HEALTH CARE

Right to good health and freedom from disease and sickness

56. Human life, its health and longevity, are fundamentally and traditionally valued in all African

[44] United Nations High Commissioner for Refugees, "Background paper ", paras. 30-32
[45] Louis Dollot, *op cit*, p 88
[46] [illegible]
[47] [illegible]

societies. Each society, in principle, recognizes its legal or moral duty to protect life and guarantee survival and well being. For instance, whereas in the past, slavery and human sacrifice were practised for religious or other social reasons, current laws and policies pursued by Governments of countries of Africa have outlawed these practices as inhuman and criminal. Thus, slavery remains a criminal offence in the statute books of the countries in the region.

57. But while preserving life constitutes a fundamental and inherent right, man's efforts to enforce it are often thwarted by the circumstances of his existence and by the controls imposed by his environment. Sickness, disease and death may all have genetic correlates; however, the major correlates of ill health and death tend to be what the environment of society provides for his survival. Here, then, lie the responsibilities of Governments to afford every citizen the right to a level of living adequate for good health and well being, "including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age, or other lack of livelihood in circumstances beyond his control".[48]

58. African development plans really show tremendous concern for improving health and general well-being. In most of the plans, there is a heavy expenditure on improving services[49] which, though comparatively inadequate, have shown marked improvement in nearly all countries of Africa. Efforts have been directed to greater and better control of communicable diseases, education in preventive measures, introduction and use of new drugs and development of health centres, including maternal and child health services. These improvements are reflected in the declining morbidity and mortality rates in parts of the continent.

59. Notwithstanding the improving situation, there are, by comparison with levels in the developed countries, inadequacies which cause disparities in the availability of medical, health and sanitary services to different segments of the population and areas of a country. Such disparities underline the failure of all citizens to enjoy equal rights to medical, social, economic and health facilities.

60. Of the inadequacies, health services feature very prominently. For instance, the ratio of between 25,000 and 50,000 persons per medical doctor in Africa compares poorly with between that of 500 and 800 in some countries of Western Europe. The *per capita* ratio of nurses, midwives and other medical technicians reflects comparable critical shortages.[50] These ratios clearly indicate that Africa has a long way to go before attaining the minimum WHO target of one medical doctor to 10,000 and one nurse to 5,000 persons for the first United Nations Development Decade, whic 1970.[51]

61. The general scarcity in the availabili facilities is more heavily weighted against th the urban areas. In the former, life expecta much lower, and the mortality and morbidit much higher. The capital or premier cities, any other area, tend to have a lion's sh facilities. Thus, in many countries of the r of the best equipped hospitals and most of t doctors, perhaps as many as two thirds of t doctors, are concentrated in towns, in spite that such towns contain a relatively small from 10 to 20 per cent, of the total popula

62. Two main factors are related to t scarcity of health facilities and personnel. Th rapid rate of population growth, which has l step with, and higher than, the increase in th medical resources and facilities. In many crease in facilities has either been relative static. The second main source of the scarcit the inadequate supply of medical and p training centres in the countries of the reg absence of national training institutions, th of the countries have followed the expensive of training their staff abroad. With respect t areas, quite apart from the misallocation o and the large population concentration, ther an increasing tendency for medical officers, ir doctors, to reject being assigned to work ir areas, where life is considered unattractive. tion has led a few Governments (e.g., Ghar and the United Republic of Tanzania) to beg service programmes in rural areas for all including medical doctors, so that they may the magnitude of the problems in rural de

63. The over-all scarcity of resource enormous significance when pitted against th very poor environmental and sanitary conditic which the major public health problems revolve. The problems and their impact are e by the existence of widespread ignorance o practices and environmental sanitation. V related to this question of ignorance and dis problem of malnutrition, which, along with cable diseases, presents a serious menace to Africa.

64. In order to tackle effectively the pr ignorance, disease and the general health pr Africa, Governments of African countries sho public health priorities which reflect the environmental conditions. Having done this, th undertake health planning within which should be allocated according to the publ priorities. The priority area should cover c against communicable diseases at the cur

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[48] Universal Declaration of Human Rights, art. 25, para. 1.

[49] "African social situation 1960-1970" (E/CN.14/POP/38), p. 31.

[50] World Health Organization, *Review of the Second Decade of Public Health Work in Africa*, part II (Geneva, 1968), p. 25.

[51] "Social change and social development in Afr sional draft)", vol. II, p. 276.

preventive level; it should embrace the planning and development of national health services and should evolve an effective programme for training sufficient and efficient medical personnel with knowledge of prevailing local conditions.

The right to food and freedom from hunger and malnutrition

65. Attempts to solve the problem of nutrition also have had limited success. Recent reports show that most of Africa has experienced a decline in food production in recent years. Consequently, a number of countries imported food to meet their normal requirements.[52] The recent drought in the Sahelian region of Africa, against which many countries were ill-equipped to meet the challenge, only serves to underline the importance of developing food programmes. These should include internal measures for dealing with emergencies, in place of wholesale reliance on importation of food, aid and charity, as happened during the drought.

66. So far, experience has shown that not many countries have viable food programmes intended to increase production. While more planning has gone into the production of cash crops, with some success, food crops continue to be grown on small allotments by traditional methods

67. A succinct medical summary of the nutrition problem in Africa was recently made.[53] The report stated that the problem is characterized by an insufficiency of calories, protein of animal origin, occasional deficiency in calcium, iron, iodine, vitamins A, B_2, thiamin, niacin, C and D. These deficiencies result from inadequacy of food production and distribution, from ignorance, prejudices and taboos, from high population growth rates, low purchasing power and the prevalence of parasites and infections in the environment. The resulting nutritional diseases, especially protein-calorie malnutrition and avitaminoses, cause death, especially among children, and increase the susceptibility of the population to such acute and chronic infectious diseases as measles, tuberculosis and pneumonia.

68. The seasonal shortage of food in many countries has been exacerbated, in part, by the lack of storage facilities. Those which are available are still managed very poorly, with the result that much of the stored food is wasted. In this respect the African situation is complicated by the fact that application of modern farming methods in general is hindered by inadequate communication and transport facilities, the ignorance and apathy of farmers and inadequate supply of production instruments for modern farming.

69. The obstacles to the full enjoyment of the right to food, namely, adequate calories and protein supply, can also be removed by efforts made in other directions. Improvement in health, education, nutrition, housing and other components of the level of living will not only help to improve farming methods and productivity, but will make the population better understand the value of good food and how to select and prepare it. Greater effort should therefore be directed along these lines to the most vulnerable groups, in terms of calorie and protein deficiency, in the rural areas and among the poor working-class groups These less fortunate groups, with very weak earning power, lack cash to buy food and, in fact, health and other services, even if these were available. They are also the least informed groups in society, and need education and training on nutritional needs.

70. Women, especially those in the pre- and post-partum periods, and children constitute two significant elements of the vulnerable population. While nutrition services should be extended to them, it is also clear that men, too, need nutrition education, since, in most African societies, in particular, in East Central and Southern Africa, the men keep the money incomes[54]

71. For any one country, a number of measures should be adopted to ensure that citizens shall enjoy their right to food First, development plans must strike a balance between the production of cash and food crops. Contingency measures against shortages should also be built into the plans. Secondly, practical steps should be taken against wastage of food crops through deterioration in the field and inadequate transportation and storage facilities. In particular, knowledge of domestic food preservation and of sun-drying of fruits and vegetables is essential Thirdly, some legisla- [illegible]

stuffs. The advice could conveniently be given under an extensive and intensive agricultural extension service scheme. Lastly, international aid programmes should be further encouraged to give assistance, technical and financial, in storing, handling, transporting and preserving food-stuffs in order to avoid wastage which, granting production increases, is the crux of the African food problem.

72. With respect to international aid, the activities of the United Nations organs and OAU deserve special mention in that they underline the awareness in the region of the lack of the full exercise of the right to food. The WHO and FAO have, in this connexion, been involved "in appraisal of nutritional problems, national food and nutrition policy, organization of services for feeding programmes, nutrition education, training of personnel, development and use of new protein-rich food, enrichment of foods as well as some other programmes dealing with food and nutrition"[55] The establishment of the Joint FAO/WHO/OAU Regional Food and Nutrition Commission for Africa, at Accra, Ghana, further attests to the growing co-operation

[52] Food and Agriculture Organization of the United Nations, *The State of Food and Agriculture, 1970* (Rome), pp. 108-112.

[53] "Social change and social development ...", p. 301.

[54] United Nations Educational, Scientific and Cultural Organization, "Comparative study on access of girls and to technical and vocational education" (ED [illegible] /3).

[55] "Social change and social deve[illegible] 300.

among the agencies in tackling a fundamental problem requiring a multidisciplinary solution. There is no doubt that Africa needs such joint effort in solving its food problems.

Implications of population trends for the formulation and exercise of human rights

73. The principal feature of past and current population trends in Africa has been and is the high rate of growth associated with a very high and constant fertility and a relatively high, but declining mortality. Internally, most countries of the region have been experiencing rapid rates of urban growth; while externally, emigration is being frowned upon and is tending to decline in volume.

74. Attempts so far made at indicating prospects for the future imply a continuation of the generally high level of fertility. Recent estimates by the United Nations [56] show that the prevailing gross reproduction rate of 3.1 in Africa, which seems to be the highest in the world, will be maintained until late into the decade of the 1980s, when a sizable fertility decline would begin, reducing the gross reproduction rate by about 16 per cent in 10 years. [57] But this net decline will be far less than anticipated in the other major developing areas, which had an earlier onset of fertility decline and a gain in momentum over time. In fact, towards the end of the century (1995-2000), the estimate clearly shows that Africa would be the only major area with a gross reproduction rate above 2.0, which is the value currently employed by the Secretariat of the United Nations to distinguish between developing and developed countries. The assumptions of the estimate imply that, by the end of the century, fertility in Africa would still be significantly higher than fertility in East Asia, South Asia and Latin America.

75. To a certain extent, mortality, more than fertility, has been more responsive to innovations and technological change. Current indications are that mortality, as a result of low cost, but effective, medical and public health programmes fostered by various Governments of countries of Africa, sometimes with external aid in cash and kind, promises to decline faster than implied above in the years ahead. Thus, the current rate of 21 deaths per 1,000 population (1965-1970) will decline to 10 per 1,000 by the period 1995-2000, implying that Africa would then have a rate comparable to that currently obtaining in Europe, for example. [58] Similarly, the current level of life expectancy of about 45 years is expected to increase significantly, if assumptions are correct, to 58.5 years during 1995-2000. [59] Nevertheless, these optimistic assessments have been unequivocally qualified to show also that, optimistic as the picture of the gains in life expectancy is, Africa would still lag behind other areas of the world in having the lowest life expectancy. In quantitative terms, UN estimates show that "Africa would still be seven years of life-expectancy-at-birth behind the level projected for South Asia, 10 years behind that for East Asia, and 13 years behind Latin America". [60]

76. The prospects for urbanization are that the current rate of growth will continue to accelerate rapidly. Recent estimates based on medium assumptions by the United Nations anticipate a rate of growth of about 5.0 per cent up to 1985. [61] This rate will again be the most rapid in the world; and, if the assumptions prove to be correct, it would raise the proportion of the urban population to 30 per cent in 1985 and 39 per cent at the end of the century. [62] Should these increases materialize, it will mean a worsening of the current problems facing many countries of Africa. Apparently, the current failure of the provision of social amenities (employment, schools, hospitals, housing etc.) to keep pace with the growing demand for such services in towns will continue, with the attendant social disorganization and deterioration of the environment and level of living.

77. It appears certain from the foregoing discussion that the general prognosis for Africa is a likely continuation of rapid population growth up to, and even beyond, the end of this century. Even if a widespread family planning programme were implemented, the current age structure holds great potentials for significant growth in size of population.

78. The impact of the implied population trend on the exercise of recognized human rights, given the social and economic circumstances of many countries, can be serious. The impact will invariably affect rights related to motherhood, in terms of maternal and child care; it will affect rights to good health, reduction of morbidity and mortality, adequate food supply, employment and income. Whether rights are diminished or enhanced does, and will, depend upon the dynamic, as well as the static, relationship between the rate of social and economic development and the rate of population growth.

79. Accelerating population growth in Africa may aggravate the problem of capital shortage, which is one of the most important obstacles to economic development in countries of Africa. The higher the rate of population growth, the greater the proportion of capital expended on the consumption of goods and the provision of social services and, therefore, the less the proportion put to production.

80. A high rate of population growth is sometimes cited as a stimulus to economic development. However, as stated in a United Nations report:

"... while in a well-developed dynamic economy the demand for capital investments may serve as a

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stimulus to continuing economic growth, the case of the under-developed is different. For most of them it is difficult to save and invest enough from their meagre annual income to permit economic development to proceed at a satisfactory pace, even without rapid population growth. It is true that if these countries can industrialize and better utilize their human as well as their natural resources, some of them, at least, will undoubtedly benefit in the long run from a substantially larger population But even where a large population would be advantageous, in the long run economic progress will be hindered, if numbers increase so rapidly as to put an excessive strain upon the economy." [63]

The point is that for economic development, the rate of growth of the population of a country is more relevant than its size; and, as has been observed earlier, the rate of growth of the population of African countries is accelerating and would, if unretarded, put the region ahead of others by having the highest rate of growth within a decade.

81. The problems relating to the general inadequacy of the public infrastructure to meet the growing needs of the population in urban areas, and the growing demand for education and employment, have received attention in a number of African development plans. For example, in Kenya, it has been shown that if fertility is not reduced in the next 25 years, the number of illiterate children will double, even with all the efforts that the Government could exert. The policy statement on the population of Ghana mentions that if the number of births could be cut by 2 per cent each year, there could be almost 2 million fewer children in 1985 and over 3 million fewer children in 2000, thus freeing funds for other types of investment and also increasing the proportion of children who can be educated.

82. The situation in which most of the African countries find themselves is typified by the following statement drawn from the 1966-1970 Ugandan development plan: "Uganda must keep moving in order to stay in the same place. Growth in output and employment of nearly 3 per cent per annum is necessary in order to maintain *per capita* standards and hence for increasing *per capita* income an even higher rate of growth has to be achieved"

83. In general, there has been a growing awareness of the effects of rapid population growth and urbanization on social and economic development. Most African development plans, as in the examples shown above, have some demographic content, and most recognize the nexus between rapid population growth and poor education, nutrition and health, high infant and child mortality and poverty in general Poverty on a significant scale undoubtedly affects the majority of Africans. The very small minority with education, skill and training live well. This minority mostly belong to the urban group of middle-class administrators, technicians, executives and businessmen. The growing disparity between the fortunate middle class and the poor, mostly rural lower class, appears very glaring in the cities where differences in the life-styles of the group stares one right in the face in the crowded streets. There are many observers who feel that the disparity should be bridged through upgrading the level of living of the working class.

84. Quite significantly, the Governments of a number of African countries, such as Kenya, the United Republic of Tanzania and Zambia, have in policy and in concrete terms addressed themselves to the problem of poverty with a view to improving not only the lot of the urban poor, but the significantly large and impoverished rural dwellers [64] Continuing efforts are made by many countries to achieve a redistribution of income and wealth through administering various taxation and income policies Furthermore, many Governments have been expanding the scope of their social services and programmes for rural and community development To achieve these, substantial sums of money have been spent in selected countries. Available estimates show that expenditure on social and community services represented in 1969 between 21.0 and 48 5 per cent of total national expenditure in 14 countries. [65] A large proportion of the social and community expenditure was for education, health services and housing programmes In order to assist in raising the cash income of the farmers, priority has also been given to agricultural schemes, including farm settlements, irrigation, co-operative farming and consolidation of land holdings

85 But while most countries implement the above-mentioned programmes and, indeed, many others, the point ought to be made that much remains to be done; and, moreover, that in terms of future population increase, the programmes have limited scope They almost all concentrate on solving social problems arising out of past social, technological and economic changes To grapple with the future, all social welfare programmes must look ahead and should therefore increasingly focus on developing preventive and consolidating services involving popular participation of the majority of the population to help in identifying future needs

86 One area to which efforts should be directed is the promotion of universal health and family security service Those currently in operation cover only wage earners in urban and large industrial enterprises The

[63] *Report of the World Social Situation, 1957* (United Nations publication, Sales No 57.IV.3), chap II

[64] Bastian de Gaay Fortman, ed., *After Mulungushi The Economics of Zambian Humanism* (Nairobi, East African Publishing House, 1969), J K Nyerere, "Ujamma—the basis

among the agencies in tackling a fundamental problem requiring a multidisciplinary solution. There is no doubt that Africa needs such joint effort in solving its food problems.

IMPLICATIONS OF POPULATION TRENDS FOR THE FORMULATION AND EXERCISE OF HUMAN RIGHTS

73. The principal feature of past and current population trends in Africa has been and is the high rate of growth associated with a very high and constant fertility and a relatively high, but declining mortality. Internally, most countries of the region have been experiencing rapid rates of urban growth; while externally, emigration is being frowned upon and is tending to decline in volume.

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large population in the rural areas are completely left out of any insurance or public assistance schemes covering old age, invalidism, death, work injury and so on. To have any real lasting effect on social and economic progress now and in the future, existing schemes, and many others not yet in operation, should be organized, given local conditions, to cover all segments of the working population in towns and villages.

87. Apart from economic, social, financial and technical provisions in the development plans for improving the social situation, specific legislation and policies have been promulgated, even if their effective implementation remains questionable. Attempts by a number of countries in formulating population policies intended to reduce the rate of growth have already been noted. But formulating a policy is one thing; its effective implementation is another. There is still so much to be done to put existing population policies on the way to achieving maximum benefits from their operation.

ACTION REQUIRED TO SAFEGUARD AND PROMOTE HUMAN RIGHTS IN THE LIGHT OF CURRENT AND PROJECTED POPULATION TRENDS

88. Increased concerted action at both national and international levels is called for in order to encourage Governments of African countries to promote the realization of human rights in the light of current and projected population trends. At the national level, it will be necessary to ensure that planners, as well as individuals within the community, should be made aware of the demographic, social and economic situation and how it affects their exercise of human rights. Without a general individual awareness, the situation where community health, survival and well-being are imperilled because of ignorance at the individual level might develop to the detriment of all. It must be conceded that creating individual awareness largely makes the task of government planners and implementers of projects simple.

89. In view of the high level of illiteracy in the continent, awareness has to be promoted through formal and informal education programmes. Intensive and extensive adult literacy campaigns for men and women, especially in the rural areas, should be encouraged. Modern teaching techniques adapted to local conditions should be employed along with the use of the mass media.

90. Already a significant body of research has been going on in many countries through national as well as international efforts and assistance. [66] Basically, attempts should be made to foster increased collaboration among research workers with a view to making rational use of scarce resources, especially by avoiding duplication of efforts. By the very nature of the problems, the collaborating teams should be multidisciplinary and should draw from the experiences of demographers, sociologists, statisticians, economists, jurists and medical specialists. More important for planning purposes, all efforts should be made to co-opt and involve as many planners and government officials in order to ensure that research findings shall be sufficiently integrated into development plans. It might even be advisable physically to locate research units within government planning offices, and require that these units work on special problems of national development.

91. Action at the international level should also cover education and research. International assistance, already on a significant level, should be increased; but, more importantly, it should involve interagency coordination and promotional action. The efforts of the agencies should be complementary rather than competitive. The promotional action of ECA in this respect includes studies, research, dissemination of information, technical assistance, regional advisory services and holding of meetings. In particular, the annual interagency coordination meetings of, respectively, UN and non-UN organizations interested in population matters has been very useful. The biennial Conference of African Demographers has also very much helped in fostering and raising the level of awareness in the African region. The adoption of recommendations on important population questions for action by the Conference of African Ministers has been, and will continue to be, useful in deciding priority items in research and planning. [67]

92. As the title of the section indicates, the action required outlines those for safeguarding and promoting human rights in the light of current and projected population trends. There are, of course, action programmes required in other related fields, such as the role of women in national development, training programmes in home economics and other family-oriented fields etc., which the secretariat of ECA is promoting.

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[66] For a record of research programmes by national and international agencies, see "Report of the expert group on population" (E/CN.14/488).

[67] For important recommendations, see, for example, "Conference of African demographers...", para. 86; "Report of the Seminar on Statistics..." para. 133; and "Report of the Working Group on Fertility Levels...", para. 148.

POPULATION AND HUMAN RIGHTS: EDUCATION AND INFORMATION*

United Nations Educational, Scientific and Cultural Organization

1. The United Nations International Conference on Human Rights, held at Teheran from 22 April to 13 May 1968, and convened to review progress achieved and to identify obstacles encountered in the field of human rights since the adoption, in 1948, of the Universal Declaration of Human Rights, proclaimed that, "The protection of the family and of the child remains the concern of the international community. Parents have a basic right to determine freely and responsibly the number and spacing of their children "[1] The Universal Declaration itself declares (article 16) that "Men and women of full age, without any limitation due to race, nationality or religion, have the right to marry and to found a family". Resolution XVIII adopted by the Conference in 1968 stated that it considered that "couples have a basic human right to [illegible]

2 In the same resolution, the Conference observed "that the present rapid rate of population growth in some areas ... reduces the possibilities of rapidly achieving adequate standards of living ... [and] education ... thereby impairing the full realization of human rights. It recognized that moderation of the present rate in some areas would enhance the conditions for offering greater opportunities for the enjoyment of human rights."

3. The preamble to the resolution recalled General Assembly resolution 2211 (XXI) of 17 December 1966, "which recognized *inter alia* the sovereignty of nations in formulating and promoting their own population policies, with due regard to the principle that the size of the family should be the free choice of each individual family".

4. The Declaration on Social Progress and Development, adopted by the General Assembly on 11 December 1969, one year after the International Conference, states in part III, Means and Methods, article 22 (*b*), that the achievement of the objectives of social progress and development requires "formulation and establishment, as needed, of programmes in the field of population, within the framework of national demographic policies and as part of the welfare medical services, including education, training of personnel and the provision to families of the knowledge and the means necessary to enable them to exercise their right to determine freely and responsibly the number and spacing of their children".[3]

5. In part II, Objectives, article 11 (*f*) of the same Declaration, it is stated that a main goal to be attained is "the guarantee that all individuals, without discrimination of any kind, are made aware of their rights and obligations and receive the necessary aid in the exercise and safeguarding of their rights".

Human rights and law

6 The declaration of the right of couples to have children and to determine freely and responsibly how many and when, was (like the other statements cited above) adopted in the context of concern about the effect of rapid population growth on the realization of human rights and on economic and social development on which, in turn, the realization of many human rights depends. The sovereignty of nations in formulating population policies, but with due regard to the principle that the size of the family should be the free choice of the couple, was recognized by the United Nations At the time, in some countries, campaigns to persuade couples to practise family planning and to have fewer children were in course or being prepared, either directed by Governments or agreed to by them In other countries, couples wishing to limit the number of their children were prevented from or hindered in obtaining the information and the means to do so, which were readily available in other countries.

7. Two principles are seen to be juxtaposed· the freedom and human rights of the individual and the responsibility and sovereignty of the State. The various United Nations declarations on human rights, on the rights of the child, on social progress and development, and others, are generally acknowledged to express the will of the international community to set standards for all peoples and States. They can be viewed as constituting an authoritative guide, produced by the General Assembly, to the interpretation of the Charter of the United Nations. Some jurists regard them as part of the law of the United Nations. They have considerable

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[2] *Ibid.*, chap III

[3] *Official Records of the General Assemb[illegible] Twenty-[illegible] Session, Supplement No 30,* resolution 2[illegible] V)

moral influence on national legislation. Many jurists would not regard them as legally binding; this, they say, is only achieved when the provisions of the declaration are embodied in a covenant, which is a treaty duly adopted, and which is only binding on the States that ratify the covenant: hence the various covenants and conventions prepared by the United Nations and the specialized agencies. Others hold that this is to confuse instruments and the rights concerned; and they maintain that legal force may be derived from non-treaty sources: natural law; customary international law; and general law.

8. A related question concerns the choices which may be forced on States when, at certain points in time, different rights may appear to conflict, or when the national financial resources required to implement them are limited. The right of couples to have as many children as they wish may be seen to conflict with the realization of the rights to an adequate level of living, to health and to education and to other rights.

9. Juridical or legislative action is not the only way to the recognition and enjoyment of human rights. It is essential, but not sufficient. Even if the juridical framework were complete and unambiguous, pervasive shortages of resources would mean that not all claims advanced as rights could be met at the same time. Questions of choice intervene to move the matter from the realm of jurisprudence into that of economics, social engineering and politics.

Rights and duties

10. The right of couples to determine the number and spacing of their children is qualified in the above-quoted paragraph 16 of the Proclamation of the International Conference on Human Rights by "freely" and "responsibly". "Freely" appears to mean without being subjected in their choice and subsequent action to any direct or indirect constraint: that society and the State may try to persuade couples to adopt a given attitude and behaviour, but not to penalize them for not doing so by discriminatory treatment in relation, for example, to children's allowances, employment or migration within their own country. "Responsibly" means the responsibility of each of the couple to the other and of the couple towards their children and those that may be born. It also means the duty of the individual towards the community and the country and even the community of peoples (see article 29 of the Universal Declaration of Human Rights), "in which the free and full development of his personality is possible". This means that both men and women, since both are involved in the choice, must be given education and information to help them to take responsible decisions, in the knowledge of what these decisions mean for themselves and for others, in terms of health and food and of education, of social and economic development and of the quality of the social and natural environment.

11. Hence, the State has a duty, and an interest if it wishes people to behave responsibly, to develop population policies for the common welfare and, having done so, to inform, persuade and assist people to act in accordance with plans and laws adopted by the democratic process. It has the duty to try to ensure that this education and information shall be made available and intelligible to all—men and women, adults and young boys and girls, of all social classes and levels of literacy and education, in towns and rural areas, and in indigenous, local and minority languages, as well as in official ones, without discrimination of any kind.

12. States that wish to see their populations grow can readily accept that couples exercise the right to have children and to have as many as they wish. But are they entitled to try to deny information and means to couples who wish to have none or to limit the size of their families and to penalize them for doing so? Or, are those States which have policies to limit population growth in the interest of the community, entitled, if persuasion fails, to try to oblige couples to limit the size of their families, or even to have no children, by means of economic and social pressures? This might seem to be an attempt on the basic rights of human beings "born free and equal in dignity and rights and endowed with reason and conscience" and on the right to marry and found a family. What, in this context, should be the interpretation of article 29 of the Universal Declaration of Human Rights: "In the exercise of his rights and freedoms, everyone shall be subject only to such limitations as are determined by law solely for the purpose of securing due recognition and respect for the rights and freedoms of others and of meeting the just requirements of morality, public order and the general welfare in a democratic society", in relation to article 30 which declares: "Nothing in this Declaration may be interpreted as implying for any State, group or person any right to engage in any activity or to perform any act aimed at the destruction of any of the rights and freedoms set forth herein"?

13. It can be maintained that the right to have children does not cover the right for a couple to have as many children as it wishes, even if it considers itself to be acting responsibly in so doing. If it comes to be recognized by a country that the unlimited exercise of the right to have children would jeopardize the exercise of other rights by the community and other individuals (including the children to be born) and might even endanger the future of human life on earth, would society then be entitled to exercise pressures to prevent this happening? In this view, it could be urged that to attempt to limit the size of families for all couples by measures democratically adopted, with no discrimination of class, income, race etc., would contradict neither the principle of equal rights nor that of the right to marry and found a family.

Population growth and human rights

14. Resolution XVIII, adopted by the International Conference of 1968, recognized that the current rapid

rate of population growth in some areas affected the full realization of human rights. In many countries, rapid population growth is making it more difficult to extend to more, let alone to all, men and women, the right to work, to free choice of employment and to freedom of movement and residence within their country; the right to social security and the economic, social and cultural rights indispensable to dignity and free development of the personality, the right to a level of living adequate for health and well-being, including food, medical care and social services; the right freely to participate in the cultural life of the community, to enjoy the arts and to share in the advancement of science and its benefits. Yet, there are reasons and evidence for believing that if these rights were more widely enjoyed, they would, in turn, contribute to reducing the rate of population growth which threatens their own realization The guarantee of regular and continued gainful employment reduces the need for children to supplement the family income. The reduction of the mortality rate, resulting from the extension of health services, affects the emotional and economic motivations towards large families The provision of social security benefits and, in particular, old-age pensions makes it less necessary for parents to seek insurance for their old age by having many children. The extension of education, which is essential to the implementation of all human rights, may be seen to have direct and indirect relations to the solution of population problems.

Effects of rapid population growth on education

15. The right to education is far from being realized for a large part of the world's current population and particularly for girls and women. Even at the primary level which, according to the Universal Declaration and the International Convention on Discrimination in Education, should be compulsory and free for all, from 20 to 50 per cent of the children concerned, in three [illegible]

[illegible]

Asia, 32 at the second level and 26 at the third level in Africa. At population growth rates for 1970-1985 as estimated by the United Nations, it is anticipated that the population aged from 5 to 14 years will increase over that period by 10 8 per cent in the developed and by 42.4 per cent in the developing countries. Even if birth rates were to drop sharply at once, which is improbable, it would be difficult for developing countries, most of which are already spending on education what seems to be the maximum percentage possible of their national budgets, to expand their educational systems so as to maintain enrolments even at their current levels, let alone to raise them. This threatens the realization of the right to education, and of rights related to education, as well as the economic and social development upon which, in turn, the expansion of education depends. The current rapid rate of population growth is not only a quantitative problem it also threatens the quality of education and with it the quality of life.

16. The total world population is increasing at the rate of 2 per cent per annum, and in some countries at a much higher rate. In some of the age groups from 0 to 24, which are the immediate concern of formal education systems, the rates of increase over the period 1965-1970 were even higher: 0-4, 2.15 per cent; 5-9, 1 35 per cent, 10-14, 2 02 per cent; 15-19, 2.71 per cent; 20-24, 3 07 per cent.

17. At the beginning of the current decade, total enrolment was increasing by only 2.5 per cent per annum, compared with an average over the years 1960-1970 of 4 1 per cent, in Africa and Asia the previously high rates have dropped to 3 5 per cent and 2.3 per cent, respectively The lowest enrolment rates are found in the areas of greatest increase in growth of population Africa, the Arab States, Asia, and Latin America

18 *Around 1970, only 71 per cent of children of* primary school age were attending school Whereas in Europe, the Union of Soviet Socialist Republics and North America, the percentage approached 100, in Latin America, it was 78, in Asia, 59, and in Africa, only 48 The percentage of children of secondary-school age, from 15 to 19, attending school was 54 per cent for the world But again, while in Europe and North America, the percentage ranged from around 70 to 90, in Latin America, it was 49, in Asia, 44; and in Africa, 25. The third-level enrolment, as a percentage of the population aged from 20 to 24, was 1.5 in Africa, 4 9 in Asia, 6 3 in Latin America, 17 in Europe and the USSR and 48 2 in North America

19. In 38 countries and territories, education at primary level is still not compulsory In 90 out of the 152 self-governing educational systems for which data were available, the duration of compulsory education did not include any part of secondary education and in a further 28 it included no more than two years.

[illegible]

the Arab States, 35. At the primary and secondary levels, there is roughly parity between boys and girls except in Asia, where the percentage of girls at primary level is 38 and at secondary 35, and in Africa, where the figures are 40 and 32. At the third level, the percentages of women by regions are: Europe and USSR, [illegible] North America, 41; Latin America, [illegible]; Asia, [illegible] and Africa, 26. This means that, when a comparison is made of the number of girls attending school with the [illegible] number of girls in the population, the proportion of [illegible] at secondary-school age going to school is [illegible] less than 10 per cent in [illegible] around 20 per cent in [illegible] America, over 30 per [illegible] and around 45 per cent in North America [illegible] level, university and higher [illegible] women is 1 or less [illegible]

and Asia; 2 in Latin America, 7 in Europe and the USSR, and 20 in North America.

21. The number of adult illiterates, aged 15 and over, continues to rise although the percentage has dropped from 39.3 in 1960 to 34.2 in the 1970s. With an estimated world adult population in 1980 of 2,820 million, it is thought that there will still be 820 million adult illiterates and an illiteracy rate of 29 per cent in spite of the effects of increased primary education enrolments and literacy campaigns.

Education and population growth

22. It is difficult to estimate the effects of education, in total enrolments and at different levels, on fertility and population trends. That there is a relationship between the level of education and the rate of fertility is generally accepted, but the complex relationships between education factors and other social and economic variables have not been adequately examined. There is no proof that there is a direct causal relationship between growth in education and fertility, leading automatically to lower birth rates. However, there is a significant difference in the rate of population growth between countries at different levels of educational development. Countries with high literacy rates and high enrolments for both men and women at all levels tend to have lower population growth rates than countries which are educationally less advanced, and they tend to have relatively low or moderate birth rates.

23. Surveys indicate that better educated people desire somewhat smaller families than uneducated people (although the difference may be equally valid as between rich and poor) and that they are having about the number of children they desire, while those with little or no education are having substantially more. Surveys of knowledge, attitudes and practice conducted in developing countries show a downward trend in fertility as educational attainments increase. The duration of schooling required to reduce fertility significantly is, on the evidence available, at least around six years, and might indeed be as long as from 10 to 14 years.

24. Adults who have reached a certain educational level usually desire education for their children. Because of the direct or indirect costs of education, this leads, in many societies, to limiting the size of the family. Education of girls and women probably postpones the age of marriage and the birth of children. The opening-up of employment opportunities for educated girls and women may also contribute to the spacing and limitation of births. There may be other consequences of education—increased material desires or changes in cultural aspirations—which contribute to the limitation of family size.

25. Whatever may be the direct or indirect effects of the enjoyment of education in itself on population trends, there is no question that some education is necessary to the exercise of the right to education and information on population and fertility matters. Population education, in and out of school, is not just sex education or family planning education, nor is it propaganda or indoctrination. The object is to promote knowledge and understanding of population phenomena within the framework of economic, social and cultural development. It is an appropriate area of study in all countries, whatever their population situation and problems. The purpose is to help children and adults to see how population changes affect them, their community and the world and how their behaviour can affect changes. The teaching methods employed enable them to learn how, in this and other fields, to take responsible decisions and to exercise their rights. The State has an interest in increasing the number of those who understand the problems and may choose to adopt the attitudes and take the action desired by society. While knowledge by itself may not lead to the desired action, it is indispensable and is likely to be more readily communicable to those with a degree of general education.

26. The growth of education is, therefore, seen to be necessary because, in relationship with other factors, it may affect behaviour in relation to population problems and also because it increases the possibilities of explaining population issues and their relation to human rights and responsibilities, and how to exercise them, to larger numbers.

Communication media and population education

27. Resolution XVIII of the International Conference provides for couples the right to adequate education and information bearing on their right to determine freely and responsibly the number and spacing of their children. This right derives from the right, declared in article 19 of the Universal Declaration, "to seek, receive and impart information and ideas through any media and regardless of frontiers". For the men and women who have long left school, for the hundreds of millions of illiterates and the tens of millions, year by year, who will not go to school, means must be found to give them information, which it is their right to receive and which is necessary to the implementation of population policies. Given the vast numbers involved, it is natural to think of the media of mass communication, press, radio, television and film, as the primary means of communication between Governments and peoples.

28. Two preliminary conditions to the use of the mass media for this purpose should be borne in mind. First, in most of the countries of the world outside Western Europe and North America, radio and television broadcasting services are directly controlled and operated by the State. States, therefore, have the power to use or not to use the media, either in the course of general broadcasting or for special programmes, to give information about problems and policies and to attempt

to change the image of what constitutes a normal, happy family. The press and the cinema, which in most of the developing countries are still largely privately operated, reach very small parts of the public because of illiteracy and the small number of cinemas and limited cinema attendance. In most developing countries, the actual listener coverage of radio broadcasting and, even more, of television is small and largely limited to urban areas, although transmission services cover the whole of most of them. Forty countries in Africa and 20 in Asia have fewer than 10 radio receivers for every 100 people. As for television, in Latin America, only two countries have more than 10 receivers for 100 people; and in Asia, 20 have fewer than 10, although television now exists in 24 countries of Africa, there are fewer than three receivers for 100 people in any of them. In many countries with populations speaking a number of different languages, radio and television services are confined to only a few of them Even allowing for family and community use of radio and television receivers, mass coverage is relatively small and limited.

29. In any event, in order that the use of the mass media may be effective, through information, education, motivation and instruction, as a basis for judgements concerning rights related to population, there needs to be support by other more personal means of communication, supplemented by traditional, community or folk means of communication. The mass media and the traditional media—story-tellers, puppet and theatre shows—can be used to give general information and education and to create a social atmosphere and attitude. The mass media can also be used to exhort to action and to advertise the existence of means and services for family planning. But the final persuasion and motivation to make the desired choices require person-to-person communication within communities.

Action to promote human rights in the light of population trends

30. It is suggested that action, at the national and international levels, is required in the following fields:

(*a*) Innovation and renovation of the formal education system—structure, content and methods—to permit and improve the provision of education at different levels to increasing numbers, within the limits of financial and human resources likely to be available for the expansion of education, special attention being given to girls and women, to rural areas, to migrants to urban areas and to immigrants;

(*b*) Expansion of out-of-school education for adults and young people through increased use of the resources of the formal education system, of the means of communication, both mass media and traditional folk media, and of industrial and commercial establishments,

(*c*) Promotion of research projects, organized co-operatively by demographers, economists, social scientists, psychologists, anthropologists, humanists and educators, on attitudes and behaviour of people in relation to population questions and human rights, and to their own personal problems, and on what factors, economic, social, cultural and educational, have contributed or might contribute to changes in attitudes and behaviour, all of which is essential to sound policy decisions and to the effectiveness of population plans and of population education,

(*d*) Development of courses, methods and techniques of population education at different levels, and for different groups within populations;

(*e*) Development of education and training in population education for teachers and communication personnel, using both mass media and traditional folk media.

HEALTH AND HUMAN RIGHTS *

World Health Organization

1. The World Health Organization definition of health, one of the fundamental human rights, is so broad "a state of complete physical, mental and social well-being" that it encompasses elements referred to in a large number of declarations, proclamations and covenants of the United Nations, and of the speciliazed agencies. [1]

2. Those elements relevant to economic, social and cultural conditions of life and to the environment, are numerous. They concern the right to live; to work, to free choice of employment, to equal pay for equal work, to just and favourable remuneration for work supplemented, if necessary, by other means of social protection; to rest and leisure; to an adequate level of living, including food, clothing, housing and the necessary social services, as well as to social security in the event of unemployment, sickness, disability, widowhood or old age; to education to participate in the cultural life of the community; to the improvement of all aspects of environmental and industrial hygiene; to the prevention, treatment and control of epidemic, endemic, occupational and other diseases; and to the creation of conditions that would assure health service and attention in case of sickness to all. The equality of men and women is affirmed.

3. The family, which is recognized as the fundamental group unit of society, is entitled to the widest possible protection and assistance. Steps should be taken for the reduction of the stillbirth rate, of infant mortality and for the healthy growth and development of children. Mothers have a right to special protection before and after childbirth. The vulnerability of the new-born child, as well as of the mother, is recognized. A separate declaration has been made on the rights of the child, to ensure that he shall be safeguarded in years of physical and mental immaturity. This declaration defines conditions that are required for physical, mental, moral, spiritual and social development, and underlines the fact that the child needs love and understanding for full and harmonious development. The position of the family in society is further delineated as it concerns marriage. Men and women of full age, without any limitation due to race, nationality or religion, have the right to marry and found a family, and marriage shall be entered into with the free consent of the intending spouses.

4. While the sovereign right of Governments in formulating and promoting their own policies is unequivocally stated, there is a proviso that due regard must be given to the rights of families. The Proclamation of Teheran expresses the latter in the following terms: "Parents have a basic right to determine freely and responsibly the number and the spacing of their children." The World Health Assembly has recognized that human reproduction involves both society and the family. The Assembly has drawn attention also to the part played by economic, social, cultural, psychological and health factors in solving population problems. Health services, including family planning care, are basic to any approach. [2]

5. The responsibility of Governments is engaged by these declarations and resolutions, in so far as they have ratified or assented to them. The involvement in the right to health and all its ramifications is clear for the 138 member States of the World Health Organization, each one of which has accepted its Constitution which states the following principle: "Governments have a responsibility for the health of their peoples which can be fulfilled only by the provision of adequate health and social measures."

HEALTH AND CONTRIBUTORY RIGHTS

6. The policies and programmes of the World Health Organization (WHO) are based on the recognition and acceptance of health as a human right. According to this Constitution, "the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being, without distinction of race, religion, political belief, economic or social condition".

7. The relationship of health to the potential of the community is recognized in the phrase, "highest attain-

* The original text of this paper (E/CONF.60/SYM.IV/18) was submitted to the Symposium on Population and Human Rights, Amsterdam, 21-29 January 1974.

[1] Among the declarations and instruments that could be cited are the Universal Declaration of Human Rights, the International Covenant on Economic, Social and Cultural Rights, the Declaration of the Rights of the Child and the Proclamation of Teheran. The text of these instruments is to be found in *Human Rights: A Compilation of International Instruments of the United Nations* (United Nations publication, Sales No. E.73.XIV.2).

[2] World Health Organization, *Handbook of Resolutions and Decisions of the World Health Assembly and the Executive Board,* vol. I, 1948-1972 (Geneva, 1973), resolutions WHA 18.49, WHA 19.43, WHA 21.43 and WHA 22.32.

able standard of health". For health as a "state of complete physical, mental and social well-being" is an ideal. There are, thus, implications for Governments who should provide the best possible conditions for the health of their peoples, but the "right" to health currently has moral rather than legal force.

8 Health depends upon the genetic inheritance of the child and the physical, social, cultural and economic circumstances into which it is born, and their maintenance or improvement throughout life. Biologically speaking, all children are not born equal They have *neither equal opportunities of prospering nor equal life* expectancy.

9. Therefore, for most people, the WHO all-encompassing definition of health is visionary; and the possibility of enjoying the right to health is remote in a world where millions are still suffering from easily preventable diseases, where approximately half the total population is either undernourished or malnourished, and where just as many have no access to adequate health care.

Socio-economic rights

10. A number of rights must be exercised or observed in order to attain the highest possible level of health. Some depend upon or are directly related to health services; others are concerned with the broad socio-economic *milieu*. The latter include the right to food, work, education, social security, rest and leisure, and the freedom to participate in the life of the community. It is the responsibility of Governments to encourage and facilitate the enjoyment of these rights by their people and to refrain from anything that might restrict or interfere with that enjoyment. Measures or neglect that limit the exercise of the right to health or to health care can be interpreted as a violation or infringement of the right to health Similarly, the infringement of certain civil and political rights may affect the individual's physical, mental and social health directly or indirectly, and in so doing, violate the right to freedom, as well as to health.

Basic health services

11. The WHO has attempted to formulate guiding principles and practical measures to help Governments to carry out their duties in achieving the health rights of their peoples The most fundamental requirement is the building of a system of health services to improve individual and family health and to provide the foundation and framework for such essentials as nutrition, maternal and child care, including family planning, prevention, control and treatment of communicable diseases, sanitation and water-supply, health education and occupational health

12 The objectives of such services are to foster normal growth and development, physically and mentally, in order to permit each individual to realize his potential. This is dependent upon continuity of care from conception to maturity. People who have not had these services are far more susceptible to preventable disease and premature death. Their capacities may be seriously impaired, which, in turn, affects economic status and fertility. Women who have not attained satisfactory physical development are less likely to arrive at a successful conclusion of pregnancy

Rights of families

13 The family is recognized as the basic social unit Internationally, the rights of families and especially the right to decide freely on the number and spacing of *children, have been clearly enunciated. The whole* question of human reproduction has wide implications for society as a whole and for the size and quality of population.

14. A population is not a turgid, undifferentiated mass It is composed of individuals, mainly living in families. They are born, become ill, recover, remain incapacitated or die They congregate in cities and towns, or live in villages and sparsely settled areas. They are producers and consumers; they inherit and transmit definite ideas and traditions; they enjoy or are deprived of health or of adequate means of livelihood

15. Nevertheless, such abstractions as demographic patterns and trends are useful in the study of populations. They are as vital in the planning of health programmes as in the framing of population policies The concentration, the age and the resources of a people living in a given area have a direct influence upon their health and upon their requirements for health services A densely populated area may mean that there is insufficient work, food and amenities for everyone The more people there are to make use of limited resources, the smaller each share will be. If the resources are not renewable, or can be renewed only after a lapse of time, they will be exhausted even more rapidly. In such circumstances, high fertility rates and high death rates often go together, with the human wastage that this *implies.*

16. On the other hand, some of the most affluent parts of the world are densely populated certain urban centres offer attractive employment which leads to a demand for services of all kinds to improve the quality of life.

17. However, it cannot be said that a low population density necessarily benefits the inhabitants of an area. A low birth rate or a high infant and/or maternal mortality rate may result in a work force that is insufficient to exploit the country's natural resources, and this affects the people's capacity to produce sufficient material wealth to support health and other services

Mortality rates

18. From the demographic point of view, the mortality rate of a population is the most reliable indication of its state of health and therefore of its enjoyment of the right to health. The trends of foetal, infant and child mortality are particularly sensitive in this

19. Freedom from early or unnecessary death, regardless of racial origin or social class, has not been achieved even in countries with relatively high levels of living and where, in general, such questions are given serious attention. Substantial differences in the infant death rates between social and ethnic groups in the same country are by no means uncommon.

Declining mortality and birth rates

20. When mortality declines in a population, birth rates usually follow a downward trend. The same complex circumstances of social and economic development and of progress in health care appear to operate, first on the avoidance of fatal illnesses and then, sooner or later, on reproductive behaviour. Recent research has shown that the more rapid the decline in infant mortality in a country, the shorter the time interval between this decline and a fall in the birth rate.

21. Many countries are taking vigorous steps to lower death rates. This is the aim of a number of health programmes, the development and application of which has been stimulated and sponsored by WHO. Research is still needed to identify the particular circumstances that affect mortality rates, trends and patterns in each country and region, especially those which prevent them from declining. Further epidemiological investigations, accompanied by clinical and laboratory research, are necessary to improve knowledge of the origin and course of the conditions responsible for high death rates.

Fertility

22. To consider death rates separately from fertility rates is a matter of strategy and not of essence, since they have an obverse relationship and are as indivisible as health itself. Health care not only may lead to the avoidance of unnecessary death, but may bring about increased birth rates by controlling infections which lower fecundity, by improving the nutritional status of mothers and children, by lengthening the fertile span of women and by increasing the chances of survival of all members of the family. Yet, as mentioned above, the complex circumstances of life that contribute to higher levels of living, not forgetting educational opportunities, often lead to the voluntary limitation of the size of the family, with or without official approval or aid.

Family planning

23. In order to exercise the right to determine the size of the family, parents most have access to knowledge and means. Family planning is a way of thinking and living that is adopted voluntarily as a result of knowledge, attitudes and responsible decisions being made by individuals and couples, in order to promote the health and welfare of the family group. Family planning includes education in the regulation of fertility, the provision of advice and services for contraception, abortion care and sterilization, and of facilities for the treatment of infertility. Access to such services and their utilization may lead to larger or smaller families, depending upon individual desires. Lack of family planning may have exactly the same result, but here not only individual desires, but ignorance, poverty, malnutrition and disease, may be concerned. Family planning is not synonymous with reduction in the birth rate. It is the expression of each family's own population policy, since it provides the means of making a responsible decision about the number and spacing of children.

Maternal and child health

24. Family planning is an important factor in achieving the aims of maternal and child health services, so as to ensure that every expectant woman and nursing mother shall maintain good health, have a normal delivery, bear healthy children and learn the art of child care. For the child, the aims are to ensure that each one shall live and grow up surrounded by love and security in a healthy environment, receiving adequate nourishment and with the opportunities to learn the elements of healthy living. Good spacing gives the mother time to recover, physically and mentally, from her last pregnancy, to breast-feed and otherwise give her child adequate nourishment, and the time to attend to physical and mental needs that influence growth and development. There is now ample evidence, from the many countries in which appropriate research has been conducted, that a woman's best childbearing period is between 20 and 35 years of age, that the risk to the mother increases with each pregnancy after the fourth and that spacing of pregnancies two or three years apart is good for the health of the mother and the child. Experience shows that large families, repeated unspaced pregnancies and pregnancies in women under 20 years of age and in those approaching middle age, all entail definite risks. Among them are the increased possibility of miscarriage, abortion and infant mortality, of malnutrition in the child and of retarded physical and intellectual growth. Pregnancy and labour may be more difficult for the mother, who may even be exposed to serious illness and death. The whole family will probably suffer where such conditions prevail. It is not necessary to underline the effect of the death of the mother on the health of the father and children. Family planning is a rational means of reducing these risks, especially when it is made available in the context of maternal and child health care and comprehensive health services.

Integrated services

25. Services planned to take care of the multiple facets of health are essential if some of the problems inherent in family planning are to be solved. Fears from many causes are associated with the use of contraception in some parts of the world. The anonymity of all-inclusive services can inspire confidence in a woman who might hesitate to attend a clinic devoted exclusively to family planning or the distribution of contraceptives. There is no embarrassment involved in being seen in a centre where all health problems can be discussed and

a woman is assured of the privacy to which she has a right. If the community is so organized, she will be helped to give birth under optimum conditions and be well disposed to consider the use of contraceptives in the future and to seek help if they do not function to her satisfaction. The couple that has been aided to produce a child, when this appeared impossible, is obviously more open to health advice of all kinds.

Nutrition

26. The rights to food, to the satisfaction it gives and to freedom from h [illegible]

illustration of the complexity and the interdependence of all health factors Undernourishment does not prevent conception, but repeated pregnancies adversely affect the nutritional state of both mother and child Where there are food shortages, the child usually suffers first, becoming vulnerable to the infections that are often the final blow in some of the less-favoured countries of the world and cause high mortality rates While the desire to have large families often represents a need for manpower and for social security, it also reflects the well-founded pessimism of the poor concerning the life expectancy of their children. The interrelationship between infectious diseases, social and economic deprivation, quantity and quality of food and of the physical and mental development of the child cannot be gainsaid. Nevertheless, the staff of health services can contribute by advising on the best possible use of the available community resources. Technical means are available for avoiding some of the more obvious deficiency diseases, among them severe forms of protein-calorie malnutrition, nutritional anaemias, endemic goitre and vitamin A deficiency, which contribute to foetal wastage and high infant and maternal mortality and their consequences

Rights of the child

27. In the past, society concentrated on the care of the pregnant woman, not only because of her obvious vulnerability, but because it is at this point in the vital chain that any care has its most dramatic effect. Various United Nations declarations and the WHO Constitution express a new point of view, in which the child's health is considered to be of equal importance to that of the mother, and within recent years, a separate declaration on the rights of the child has been adopted by the United Nations.

28. Ideally, the child should be able to be born free of hereditary defects, with adequate foetal development and without birth trauma, to be wanted and to be loved. The child needs the right kind of food, protection from the major infections and from injury, and access to education that will lead to the development of a sense of responsibility. The growing child needs to be protected from danger and this need for care and protection is recognized as a basic human right. The child also must be taught to protect himself and others: the right to protection carries an implicit obligation to undertake responsibilities. The development of the responsible person is of particular importance when it is a question of exercising the right to family planning

Women's rights

29. Women's rights are associated with the exercise of many rights and have health implications and possible demographic consequences. A woman's education and the degree to which she participates in the social, economic and cultural life of the community condition her attitude towards life and her expectations, her status in the family and the community, and will probably influence her decision about the number and spacing of her children An educated woman is likely to marry later, which may affect the size of her family Being literate, she can more easily take advantage of information and instruction on family planning If she avails herself of the right to work outside the home, this may also be a factor in influencing family size Whatever the couple's decision about the number and spacing of children, the informed woman's contribution is likely to be a responsible one Large families can prevent women from enjoying their full rights, from pursuing educational opportunities, from exercising the right to free employment and from fully enjoying the right to health

Family responsibility

30 If sound decisions about family planning or population policy are to be made, they must be made by responsible people, fully aware of the consequences of their decisions for themselves and for others. Government action, either positive or negative, can clash with the desires of families and invidua1s and seriously affect their rights. Even where family planning is accepted and promoted, there can be a denial of rights where an aesthetically satisfying or biologically safe method of contraception is not available Only education at all levels and using all known techniques (from mass media to formal higher education) can reconcile the many and varying points of view involved in this situation Neither the imposition of policy nor the provision of services is enough. National interest cannot transcend human behaviour, especially traditional behaviour. It is essential that policy makers and community leaders possess knowledge of all the factors involved so as to inspire confidence and free communication with families requiring advice and help on birth control or infertility

Influence of tradition

31. Tradition and family planning sometimes go hand in hand. Many societies have ancient methods of spacing children· some kind of birth control is used almost everywhere Certain practices are being discarded by societies in transition, and the development of women's rights leading to monogamy can mean greater risks to the mother due to the possibility of more frequent childbearing, if no other method is substituted for the

enforced abstinence of polygamous marriage. As the old ways are left behind, modern contraceptives are sometimes viewed with suspicion as interference with traditional or inherent rights. The gap in communication can be even greater when the offer of help has authoritarian overtones rather than the ring of disinterested service. Health workers who understand the force and utility of tradition in community life can use it to bridge the gap in understanding. There is much to be learned here, for tradition itself can erect substantial barriers to free choice of family size. It may operate as social disapproval of small families; pity for the childless woman, who possibly is subject to ostracism or even divorce by her husband; or praise and admiration for the woman who produces many sons, no matter what the consequences for her health or that of her family.

Legal obstacles

32. A number of other obstacles exist to making free and responsible choices of family size and they constitute infringements of declared human rights. Some are legal. In certain countries, laws forbid the sale or distribution of contraceptives. In others where it is permitted, the fact may not be mentioned publicly or advertised. In not a few countries, no form of family planning, neither information, services, nor means, is available. Sometimes the distribution of contraceptives is separate from health services; and there is no follow-up nor means of reassuring or helping women who subsequently have difficulties, exposing them to psychological distress and health risk and often causing them to abandon the methods recommended. Even where other forms of contraception are permitted, abortion laws may prevent women from interrupting pregnancy when contraception has failed. In a few countries, abortion on demand is accepted, but this is rare. The range is from this liberal position to the other extreme where access to legal abortion is denied even in those cases where there are serious medical and other indications.

33. Abortion is not recommended as a substitute for contraception as it is not conducive to the optimum physical and mental health of the mother. However, when there are indications that abortion care is necessary and a national policy has been declared on this matter, it should be provided under the best possible medical conditions.

Economic obstacles

34. A whole range of economic problems, from the national to the individual, may interfere with the right to health and to free choice of the size of the family. Governments may not be able to afford the cost of delivering health services to the whole or part of the population, nor to provide the staff to operate them. Individuals may not be able to pay for contraceptive devices, abortion care or treatment of infertility, not to speak of the necessities of life upon which health depends. The desire for a large family may be economically based, especially in an agricultural community. The illiteracy that so often accompanies poverty may in itself be an obstacle to making an informed and responsible decision about family size.

Research

35. Both the United Nations and the World Health Organization have recognized the human right to information and access to family planning services. However, there are many aspects of the question on which definite knowledge is lacking. Only careful research can provide the answers to problems that must be solved if the full expression of human desires, of individuals and members of families and of society, is to be achieved. Some of these problems are biomedical and are related to scientific aspects of human reproduction, while others are behavioural. All have clinical and public health importance.

36. Since the early 1960s the research programme of WHO has taken into account the many unknowns that prevent the successful delivery of family planning services. Special emphasis has been given to problems related to fertility regulation and birth-control methods, and to the study of infertility. Pregnancy wastage, foetal physiology and the mechanics of labour have also been studied. Research into the biomedical aspects of reproduction include reproductive biology and physiology, pharmacology and clinical questions concerned with the widespread use of contraceptives. The aim is to provide Governments with the best technical advice possible for family planning programmes and to increase understanding of human reproduction leading to the development of a variety of safe, acceptable and effective methods for its regulation. At the same time, investigations have been carried out in a variety of cultures and under different social conditions to determine how best to make knowledge of these methods accessible and available to the public, and to provide desirable and suitable services.

SUMMARY

37. In view of the wide range of human rights proclaimed by the United Nations and referred to above, any conclusions concerned with health must sooner or later lead to a discussion of whose health care is primary and be assessed in relation to the various priorities of a country and its constituent parts, namely, the community, the family and the individual. A number of differing interests are involved and compromises will inevitably have to be made if the health and harmonious relations of all peoples are to be achieved. Hence, the following questions will be likely to recur.

38. The sovereign rights of States are undisputed. Governments decide upon their own policies from the point of view of the greatest good for the greatest number. Yet, many social, economic and political conditions set and determined by a Government may affect the decisions made by a family unit as to when to have

children and how many. Governments may, for example, offer, depending upon their policies, positive or negative financial inducements with regard to family size, such as will have obvious implications for the health of the family. In the same light, information and services for family planning may, or may not, be made available. This, too, directly affects a couple's achievement or avoidance of parenthood—a major event in their life and mutual harmony.

39. However, the subject is a complex one, and today the difficulty in the implementation of human rights lies in the gap between actualities and the complex nature of the rights themselves and their requirements.

40 Human rights, without implementing legal instruments, are likely to remain pious wishes. However, the culture, religious and ethical situations in individual countries need to be considered, even if, from the strictly logical point of view, experts might well consider having recourse to what appear to be rational solutions.

41. The interest of WHO in respect of the health aspects of human rights is clear. In association with member States, the Organization is concerned to implement the objectives of its Constitution and the policies laid down by the World Health Assembly.

LE STATUT LEGAL DE LA FEMME MUSULMANE DANS PLUSIEURS PAYS DU MOYEN-ORIENT *

Commission économique des Nations Unies pour l'Asie occidentale **

1. Le Moyen-Orient étant composé d'une population en grande majorité musulmane, la législation des pays de cette région est nécessairement inspirée du droit musulman. Or, la loi musulmane (*shari'a*) découle directement des textes sacrés de l'Islam; il est donc difficile de concevoir un droit indépendant de la religion. Ainsi, pour étudier le statut de la femme musulmane, il faut se référer aux sources traditionnelles du droit musulman, c'est-à-dire aux textes sacrés de l'Islam.

2. "Aujourd'hui J'ai parachevé votre religion et vous ai accordé Mon entier bienfait. J'agrée pour vous l'Islam, comme religion" [1], "Nous n'avons rien omis dans l'Ecrit" [2] "Et Nous avons fait descendre sur toi l'Ecriture (comme) Eclaircissement de toutes choses, (comme) Direction, Miséricorde et Annonce pour les Musulmans" [3]. Le Coran, première source de la loi, est le livre sacré de l'Islam, il renferme les révélations successives d'Allah à son Prophète Mohammed. Il se compose de 114 chapitres (*sourates*) divisés eux-mêmes en 6 219 versets (*ayats*). Les textes coraniques qui ont trait au droit se caractérisent par deux tendances : d'une part, les textes juridiques sont peu nombreux, d'autre part les prescriptions juridiques sont formulées en principes généraux ne comportant pas de détail (sauf pour les grands crimes et les droits successoraux qui sont réglés d'une façon assez minutieuse). Ces deux tendances ont rendu le droit musulman apte à évoluer.

3. Le Coran a pour compléments indispensables les récits (*hadiths*) qui relatent le comportement du Prophète dans diverses circonstances de sa vie et dont l'ensemble forme la tradition (*Sunna*). La *Sunna*, deuxième source principale de droit musulman, constitue avec le Coran les deux sources principales de ce droit. Cette source n'est que l'expression indirecte de la volonté divine; c'est la conduite du Prophète, les paroles prononcées par lui, ses actes ou enfin ses attitudes tacites, approbatives ou réprobatives.

4. L'étude du Coran et ses explications ont donné naissance à une science appelée *tafsir* (interprétation ou explication). Le *tafsir* n'est pas une source de la loi mais l'outil indispensable à la compréhension du Coran et de la *Sunna* tant du point de vue du sens à accorder aux mots que de celui de la graphie.

5. Par ailleurs, lorsque le Coran et la *Sunna* expliqués par le *tafsir* ne prévoient pas de solution à un problème posé, on peut avoir recours à deux nouvelles sources (dérivées) de normes juridiques, l'*idjmaa* et le *qiyass*. Celles-ci ne reposent plus sur l'interprétation littérale des textes, mais consacrent le rôle du raisonnement collectif et individuel dans l'élaboration de la règle de droit, l'*idjtihad*.

6. L'*idjmaa*, troisième source du droit musulman a pour fondement le dogme de l'infaillibilité de la communauté musulmane lorsqu'elle est unanime. Ce n'est pas une assemblée publique ni un concile religieux. L'accord à l'unanimité ne saurait être conçu comme le résultat d'un plébiscite imposé à tous les peuples musulmans. Au point de vue de l'objet, le rôle de l'*idjmaa* est de statuer sur un problème qui n'a pas été tranché par le Coran ou la *Sunna*. L'*idjmaa* se réduit en dernière analyse à un facteur d'évolution du droit musulman. Grâce à lui le droit musulman a acquis une souplesse suffisante pour s'adapter à l'évolution de la société musulmane.

7. Le *qiyass* est le raisonnement analogique utilisé lors de la résolution de certains problèmes en les ramenant à des cas semblables réglés conformément à l'esprit de la loi. C'est la quatrième source de la loi et la première fondée sur un critère purement humain, donc faillible. Les controverses qu'elle a suscitées nécessitent que la loi soit définie de manière précise de façon à éviter les déductions arbitraires et inconséquentes. Il arrive que deux déductions formulées par deux théologiens-juristes (*mudjtahids*) différents peuvent être parfaitement contradictoires. C'est pourquoi la déduction analogique ne peut s'ériger en loi qu'avec le consensus des docteurs et relève alors de l'*idjmaa*.

8. *L'idjtihad* est l'effort de création législative opéré par le *mudjtahid*, au moyen du *qiyass* et de *l'idjmaa* pour résoudre les problèmes qui se posent à la communauté musulmane conformément aux fondements de la *Shari'a* (Coran et *Sunna*). Il vise à renouveler la loi afin de l'adapter constamment aux exigences nouvelles de la communauté. C'est le principe même d'évolution de l'Islam du septième au dixième siècle de notre ère,

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** Résumé d'une étude préparée pour le Bureau des affaires économiques et sociales de l'Organisation des Nations Unies à Beyrouth par M. William Haddad, docteur en droit, chargé de cours à la Faculté de droit de l'Université libanaise, avec la collaboration de M. Soufy Ahoutalib, docteur en droit, professeur à la Faculté de droit au Caire.

[1] Coran, Sourate V, 5/3.

[2] *Ibid.*, Sourate VI, 38.

[3] *Ibid.*, Sourate XVI, 91b/89.

époque à laquelle il va disparaître pour faire place au conformisme, le *taqlid*.

9. Les deux notions contraires d'*idjtihad* et de *taqlid* sont conciliables par le fait que cette dernière ne s'applique qu'aux principes fondamentaux de l'Islam. Celui-ci est le fondement religieux sur lequel reposent les différentes écoles du *fiqh* (interprétation des textes sacrés en matière juridique). Les seuls jurisconsultes au pouvoir absolu ont été les fondateurs (*imams*) des quatre rites orthodoxes:

a) En premier lieu, le rite (école) hanéfite, fondé par l'Imam Abou Hanifa (mort en 767 de notre ère) en Irak. Son école est celle des partisans de la "raison" (*ra'y*); elle compte le plus grand nombre de fidèles. plus d'un tiers des musulmans du monde entier[4] (Irak, Syrie, Egypte, Jordanie, Liban, Pakistan, Inde, Afghanistan, Union des Républiques socialistes soviétiques et Turquie),

b) En deuxième lieu, le rite (école) malékite, fondé par l'Imam Malek (mort en 795 de notre ère) Ses partisans appelés "gens du *hadith*" par opposition aux gens du *ra'y*", sont au nombre de 85 millions environ[4] (principalement en Afrique du Nord, au Nigéria, au Soudan et au Koweït);

c) En troisième lieu, le rite (école) chaféite, fondé par l'Imam Al-Chafei (mort en 820 de notre ère) est une sorte de synthèse des deux rites précédents. C'est le second par son importance numérique: 130 millions d'adeptes en Indonésie, à Bahreïn, en Arabie méridionale, en Insulinde, en Afrique orientale, en Egypte et en Syrie

d) En quatrième lieu, le rite (école) hanbalite, fondé par l'Imam Iban Hanbal (mort en 855 de notre ère) prône le retour à la tradition rejetant toute innovation. La secte des Wahhabites, fondée au dix-huitième siècle en Arabie, compte les seuls adeptes de ce rite. Le hanbalisme est la doctrine officielle de l'Arabie Saoudite.

10. L'importance de ces écoles a varié selon les pays et les époques pour des raisons politiques. A l'heure actuelle, elles se reconnaissent mutuellement comme orthodoxes puisque leurs divergences ne sont que rituelles ou juridiques et que le Prophète aurait dit dans un *hadith* "les divergences d'opinions régnant dans ma communauté sont une manifestation de la grâce de Dieu"[5]. Les adeptes des quatre grandes écoles sont désignés sous le vocable de "gens de la Tradition" *(ahl-el-Sunna)*[6]

11. En outre, des sources spontanées, telles la coutume, *l'Orf*, la jurisprudence, *l'amal* et le règlement, le *qanoun* et la loi sont des sources inépuisables qui entraînent l'évolution du droit positif dans les différentes écoles Bien que les coutumes locales n'aient jamais été considérées comme les sources de la loi musulmane, elles ont acquis une importance certaine par des moyens divers La majorité des docteurs n'a jamais accordé à *l'Orf*, la coutume, la valeur d'une règle légale. Son rôle est d'adapter la loi plutôt que de la modifier. D'autre part, la règle jurisprudentielle, *l'amal*, qui a souvent pour fondement la coutume, vient aussi suppléer à la carence de la *Shari'a* dans le développement du droit positif.

12 [illegible]

de la *Shari'a* C'est une sorte de sécularisation de la loi islamique dans le domaine politique.

13 On s'apercevra que treize siècles plus tard, le statut de la femme dans certains pays du Moyen-Orient demeure régi par les dispositions de la *Shari'a* et qu'en dépit d'une certaine évolution la *Shari'a* demeure la source juridique fondamentale.

Le statut juridique de la femme d'après la législation coranique

Le statut de la femme dans la famille

Les fiançailles (Khutba)

14. L'importance des fiançailles (ou promesse de mariage) est toute relative en droit musulman, puisque les parties peuvent ne pas y donner suite sans encourir de sanction légale Elles peuvent être conclues à tout âge. Les fiançailles n'ont donc, en principe, aucun effet juridique, mais une indemnité pourrait cependant être accordée dans le cas où la rupture des fiançailles causerait un dommage. Cette indemnité est fondée sur la responsabilité délictueuse

15. Il n'est pas rare dans certains pays que l'on arrive à la "conclusion du mariage" ou "signature du contrat" *katb el kitab* sans que les fiancés aient pu se voir. Cette pratique va à l'encontre de la règle religieuse la plus stricte qui permet au prétendant de voir le visage et les mains de sa future épouse

Le consentement au mariage

16. Le mariage en droit musulman est un contrat consensuel, il n'est soumis à aucune condition de forme et n'implique aucune solennité, ni religieuse, ni civile Le consentement mutuel suffit pour la conclusion du mariage, mais la présence de deux témoins musulmans est exigée pour sa validité.

17. Théoriquement, toute personne pubère doit donner son consentement au mariage et toute personne impubère peut être contrainte au mariage en vertu du droit de contrainte matrimoniale, le droit de *djabr*. Le mariage des mineurs ou des simples d'esprit est soumis au consentement de leur représentant légal, le *wali*.

18 Le titulaire du droit de *djabr* est le père, mais l'ordre selon lequel il est dévolu, en l'absence du père, varie selon les rites. L'institution du *djabr* est établie dans l'intérêt de l'enfant.

[4] Voir S Mahmassani, *Cours de droit musulman et libanais*, Beyrouth, Faculté de droit, 1967 (en arabe).
[5] *Idem*
[6] Le rite chiite qui se rapproche des écoles orthodoxes par bien des points s'en écarte par son refus d'accepter la fermeture de la "porte de l'effort" (*idjtihad*).

19. La durée du droit de *djabr* est variable selon les écoles. Pour les Hanéfites, elle cesse à l'âge de la puberté pour les garçons comme pour les filles. A cet âge, la femme comme l'homme aura le droit de se marier sans avoir besoin de l'autorisation du *wali*; elle pourra conclure son mariage elle-même ou par un mandataire. Pour les Malékites la durée du *djabr* cesse après la puberté au moment de la perte légale de la virginité. Contrairement aux Hanéfites, les Malékites, Chaféites et Hanbalites ne permettent pas à la femme de conclure seule son mariage, même si elle n'est plus soumise au *djabr*; c'est toujours son *wali*, qui la représente après avoir obtenu son consentement, et s'il s'abstient, elle peut s'adresser au juge.

20. La validité du mariage du mineur contracté par le *wali* dépend de l'autorité du *wali*. Le père a une autorité absolue, les autres *wali* ont une autorité restreinte. Si le mariage est contracté par le père de l'enfant (ou le grand-père), il est supposé être conclu dans l'intérêt de l'enfant, aussi reste-t-il toujours valable et irrévocable à moins que le contraire soit prouvé. On justifie cette règle par l'amour et la tendresse du père envers ses enfants. Par contre, s'il est conclu par un *wali* autre que le père, le mariage est révocable à moins qu'il ne soit dans l'intérêt des mineurs. Dans ce cas, même si le mariage est conclu dans les meilleures conditions, l'enfant a, à l'âge de la puberté, l'option de puberté (*khyar alblough*), c'est-à-dire qu'il a le droit de s'adresser au juge pour demander la dissolution du mariage.

Illégalité du mariage de la femme musulmane

21. L'homme musulman peut en principe se marier avec une femme du Livre (chrétienne ou juive).

22. En revanche, le mariage de la femme musulmane avec un non-musulman ne peut en aucun cas être toléré. L'interdiction est absolue. La justification en est la suivante: le mariage d'un musulman avec une femme juive ou chrétienne ne porte pas atteinte à la religion des épouses puisque l'Islam reconnaît les deux religions du Livre. Quant au mariage d'une musulmane avec un non-musulman, il est considéré comme préjudiciable à la foi de la femme musulmane, car l'homme chrétien ou juif ne reconnait pas la religion musulmane, postérieure aux deux autres. La femme musulmane qui en connaissance de cause, ne se conforme pas à cette interdiction est considérée comme apostate [7]. En droit musulman, l'apostasie est une cause d'extinction de la personnalité et de mort civile absolue [8]. L'apostasie est même passible de lapidation. L'impossibilité légale du mariage de la musulmane avec un non-musulman a toujours fait l'accord unanime de la communauté musulmane [7].

La dot maritale (mahr)

23. La dot est une des conditions essentielles du mariage, un mariage sans dot est considéré comme nul chez les Malékites.

24. Les Hanéfites ne vont pas jusqu'à le considérer comme tel : mais en cas de décès ou de répudiation, la dot non fixée lors du mariage sera calculée en fonction de la situation sociale de la femme avant celui-ci, c'est la dot de parité ou d'équivalence (*mahr-al-mithl*).

25. Il faut préciser que la dot est totalement distincte du trousseau et qu'elle doit se présenter sous forme d'argent ou de valeurs immobilières mais en aucun cas de choses interdites. Elle peut être réduite à une valeur symbolique; cette solution est admise pour un homme pauvre, mais dans la majeure partie des cas la dot doit correspondre à la condition de la femme.

26. C'est une erreur que d'assimiler la dot à un prix de vente car le mariage (*nikah*) n'a jamais été identifié à un contrat de vente. La dot est accordée légalement à la femme pour subvenir à ses besoins en cas de répudiation par le mari, d'autre part elle invite ce dernier à réfléchir avant de prendre une telle mesure. La dot est généralement divisée en deux parties, l'une payable au moment de la conclusion du mariage (*moucadam)* et la seconde à sa dissolution (*moukhar*). En cas de décès du mari, le *moukhar* est la première somme prélevée sur l'héritage.

27. Quant au moment où la dot doit être payée, il faut distinguer entre le contrat valable et le contrat vicié (annulable). Dans le premier cas, elle n'est exigible qu'après la consommation effective du mariage. Si le mariage valable est résilié avant sa consommation, la femme recevra la moitié de la valeur du *mahr*.

28. Allant à l'encontre des dispositions légales dans ce domaine, on constate aujourd'hui que le montant du *mahr*, loin d'être dérisoire, atteint souvent des sommes élevées dans quelques pays islamiques.

Le devoir des époux

29. La supériorité bien établie de l'homme sur la femme n'empêche pas qu'il ait aussi des devoirs envers elle: premièrement, le devoir de cohabitation, une fois le mariage consommé; deuxièmement, la consommation du mariage et l'accomplissement du devoir conjugal; troisièmement, le mari doit bien traiter sa femme à l'exemple du Prophète; quatrièmement, l'entretien, le *nafaqua*, est l'obligation fondamentale du mari, s'il ne s'y soumet pas, la femme a le droit de demander la dissolution du mariage.

30. Les devoirs de la femme sont faciles à déduire: premièrement, elle doit obéissance à son mari pour toutes choses licites, elle ne peut se refuser à lui qu'enceinte ou malade; deuxièmement, elle ne doit pas quitter le domicile conjugal à moins qu'une autre résidence n'ait été prévue dans leurs accords; troisièmement, elle doit vaquer aux occupations ménagères si son mari ne peut lui offrir des serviteurs; quatrièmement, elle doit fidélité à son mari: "Dotez-les équitablement, qu'elles soient chastes, qu'elles n'aient pas d'amants" [9].

[7] Voir M. Chaltout, Al-Fatwa, *Les avis donnés par les Ulémas*, Le Caire, publications de l'Administration générale de la Culture islamique, 1959, (en arabe).

[8] Voir F. M. Pareja, *Islamologie*, Beyrouth, Imprimerie Catholique, 1964.

[9] Voir L. Milliot, *Introduction à l'étude du droit musulman*, Paris, Sirey, 1953.

La polygamie

31. Le mari musulman peut simultanément avoir quatre épouses légitimes et autant de concubines qu'il le désire. Institution préislamique, la polygamie a été transformée en tétragamie par l'Islam. Du point de vue de sa réglementation, la polygamie est déterminée par deux conditions : égalité entre les épouses et obligation de les entretenir.

32. La femme qui ne voudrait pas encourir le risque d'avoir des co-épouses a le droit de faire insérer dans son contrat de mariage une clause entraînant sa dissolution si le mari venait à prendre une autre épouse. D'ailleurs, peu nombreux sont les hommes qui pratiquent actuellement la polygamie.

Le concubinage

33. La limite imposée à l'homme en matière de polygamie ne concerne que les épouses légitimes, pour les concubines le nombre est illimité. Le concubinat qui trouve sa source dans le Coran relève à la fois de l'esclavage et de la polygamie.

34. Institution très répandue dans l'Arabie préislamique, l'esclavage cadrait bien avec les mœurs guerrières de l'époque. L'Islam améliora cet état de choses, recommandant l'affranchissement des esclaves et faisant disparaître l'esclavage presque complètement

La répudiation et autres formes de dissolution du mariage

35. La répudiation (*talaq*) qui signifie en arabe "libération d'un lien" est le moyen par lequel le mari renonce à tous les droits qu'il a sur la femme en vertu de son contrat de mariage [10]. *C'est un droit accordé uniquement* à l'homme qui, en vertu de la Loi Divine, peut à tout instant, sans formalités, rompre le lien conjugal. La femme ne jouit pas de ce privilège, à cause de sa nature émotive. trop impulsive, elle risquerait de ne pas réfléchir suffisamment avant de prendre une décision aussi grave

36. La répudiation est mal vue en droit musulman. Le mari a la possibilité de répudier sa femme trois fois. La répudiation est révocable les deux premières fois, mais elle devient irrévocable après la troisième fois.

37. La répudiation révocable ne prive pas le mari de son droit de reprendre sa femme et cela sans avoir besoin d'un nouveau contrat. Elle n'a aucun effet sur leur engagement réciproque. Au contraire, la répudiation irrévocable a pour effet la dissolution du mariage, le mari ne peut plus reprendre sa femme sans son consentement et leur engagement réciproque n'existe plus.

38. Par ailleurs, le mariage peut être dissous par le *qadi*, à la demande de l'épouse :

a) Si le mari ne subvient pas à son entretien;

b) En cas d'absence prolongée du mari;

c) Au cas où il y aurait eu conclusion d'un mariage en dépit de liens de parenté interdits;

d) En cas de vice rédhibitoire inhérent à l'époux (impuissance, maladie);

e) S'il y a sévices ou mauvais traitements.

39. Le Coran ne condamne pas la séparation par consentement mutuel des époux "Si une femme craint, de son époux, rudesse ou indifférence, nul grief à leur faire s'ils procèdent entre eux à quelque arrangement, car l'arrangement est un bien" [11]. Le *khoul* est l'institution par laquelle le mari répudie son épouse à la demande de celle-ci qui s'engage à lui verser une compensation, il est blâmable, dit Al-Ghazali, que le mari lui réclame plus qu'il n'a donné en dot [12].

La garde des enfants (hadana)

40. En ce qui concerne la garde des jeunes enfants ce sont les femmes qui ont le pas sur les hommes Dévolue à la mère, la *hadana* passe, si cette dernière venait à faire défaut, aux femmes de la ligne maternelle de préférence. Cependant la mère, d'après l'opinion de plusieurs juristes, perd automatiquement ce droit si elle se marie avec un homme qui n'est pas parent de l'enfant à un degré tel que la garde puisse éventuellement lui être dévolue [13] La personne à qui est dévolue la *hadana* doit veiller à l'entretien et à l'éducation de l'enfant sans en assumer les frais

Le droit à la contraception

41. Le Coran et les *hadiths* sont émaillés d'exhortations à la procréation Mais ceci n'implique pas que les pratiques contraceptives aient été condamnées par l'Islam. *La seule qui soit mentionnée dans les textes* sacrés est le "coïtus interruptus" ou (*azl*) Les *hadiths* nous apprennent qu'on y avait recours du temps du Prophète et qu'elle aurait reçu son approbation dans certains cas.

42. Les Etats qui ont inauguré une politique de famille planifiée, l'Egypte en particulier, ont obtenu des docteurs de la Loi, des *fatwas* en faveur de la limitation des naissances. M Chaltout, Cheikh d'Al-Azhar [14], est en faveur de celle-ci dans les cas suivants : femmes trop [illegible]

43. Quant à l'avortement, il est admis par le même auteur, dans le cas où la vie de la mère se trouverait en danger. Au cours des siècles les *Ulémas* se sont penchés sur le problème des pratiques abortives. Cependant la divergence de leurs vues prouve que les textes sacrés permettent des interprétations multiples.

[10] F. M Pareja, *op cit*

[11] Voir Coran, Sourate IV, 127/128.

[12] Al-Ghazali, *Le livre des bons usages en matière de mariage*, traduction française annotée par L. Bercher et G H Bousquet, Paris, A Maisonneuve, 1953.

[13] L. Milliot, *op. cit.*

[14] M Chaltout, *op cit.*

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23. La dot est une des conditions essentielles du mariage, un mariage sans dot est considéré comme nul chez les Malékites.

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25. Il faut préciser que la dot est totalement distincte du trousseau et qu'elle doit se présenter sous forme d'argent ou de valeurs immobilières mais en aucun cas de choses interdites. Elle peut être réduite à une valeur symbolique; cette solution est admise pour un homme pauvre, mais dans la majeure partie des cas la dot doit correspondre à la condition de la femme.

26. C'est une erreur que d'assimiler la dot à un prix de vente car le mariage (*nikah*) n'a jamais été identifié à un contrat de vente. La dot est accordée légalement à la femme pour subvenir à ses besoins en cas de répudiation par le mari, d'autre part elle invite ce dernier à réfléchir avant de prendre une telle mesure. La dot est généralement divisée en deux parties, l'une payable au moment de la conclusion du mariage (*moucadam)* et la seconde à sa dissolution (*moukhar*). En cas de décès du mari, le *moukhar* est la première somme prélevée sur l'héritage.

27. Quant au moment où la dot doit être payée, il faut distinguer entre le contrat valable et le contrat vicié (annulable). Dans le premier cas, elle n'est exigible qu'après la consommation effective du mariage. Si le mariage valable est résilié avant sa consommation, la femme recevra la moitié de la valeur du *mahr*.

28. Allant à l'encontre des dispositions légales dans ce domaine, on constate aujourd'hui que le montant du *mahr*, loin d'être dérisoire, atteint souvent des sommes élevées dans quelques pays islamiques.

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29. La supériorité bien établie de l'homme sur la femme n'empêche pas qu'il ait aussi des devoirs envers elle: premièrement, le devoir de cohabitation, une fois le mariage consommé; deuxièmement, la consommation du mariage et l'accomplissement du devoir conjugal; troisièmement, le mari doit bien traiter sa femme à l'exemple du Prophète; quatrièmement, l'entretien, le *nafaqua*, est l'obligation fondamentale du mari, s'il ne s'y soumet pas, la femme a le droit de demander la dissolution du mariage.

30. Les devoirs de la femme sont faciles à déduire: premièrement, elle doit obéissance à son mari pour toutes choses licites, elle ne peut se refuser à lui qu'enceinte ou malade; deuxièmement, elle ne doit pas quitter le domicile conjugal à moins qu'une autre résidence n'ait été prévue dans leurs accords; troisièmement, elle doit vaquer aux occupations ménagères si son mari ne peut lui offrir des serviteurs; quatrièmement, elle doit fidélité à son mari: "Dotez-les équitablement, qu'elles soient chastes, qu'elles n'aient pas d'amants" [9].

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32. La femme qui ne voudrait pas encourir le risque d'avoir des co-épouses a le droit de faire insérer dans son contrat de mariage une clause entraînant sa dissolution si le mari venait à prendre une autre épouse. D'ailleurs, peu nombreux sont les hommes qui pratiquent actuellement la polygamie.

Le concubinage

33. La limite imposée à l'homme en matière de polygamie ne concerne que les épouses légitimes, pour les concubines le nombre est illimité. Le concubinat qui trouve sa source dans le Coran relève à la fois de l'esclavage et de la polygamie.

34. Institution très répandue dans l'Arabie préislamique, l'esclavage cadrait bien avec les mœurs guerrières de l'époque. L'Islam améliora cet état de choses, recommandant l'affranchissement des esclaves et faisant disparaître l'esclavage presque complètement.

La répudiation et autres formes de dissolution du mariage

35. La répudiation (*talaq*) qui signifie en arabe "libération d'un lien" est le moyen par lequel le mari renonce à tous les droits qu'il a sur la femme en vertu de son contrat de mariage [10]. C'est un droit accordé uniquement à l'homme qui, en vertu de la Loi Divine, peut à tout instant, sans formalités, rompre le lien conjugal. La femme ne jouit pas de ce privilège, à cause de sa nature émotive: trop impulsive, elle risquerait de ne pas réfléchir suffisamment avant de prendre une décision aussi grave.

36. La répudiation est mal vue en droit musulman Le mari a la possibilité de répudier sa femme trois fois La répudiation est révocable les deux premières fois, mais elle devient irrévocable après la troisième fois.

37. La répudiation révocable ne prive pas le mari de son droit de reprendre sa femme et cela sans avoir besoin d'un nouveau contrat. Elle n'a aucun effet sur leur engagement réciproque. Au contraire, la répudiation irrévocable a pour effet la dissolution du mariage, le mari ne peut plus reprendre sa femme sans son consentement et leur engagement réciproque n'existe plus.

38. Par ailleurs, le mariage peut être dissous par le *qadi*, à la demande de l'épouse:

a) Si le mari ne subvient pas à son entretien;

b) En cas d'absence prolongée du mari;

c) Au cas où il y aurait eu conclusion d'un mariage en dépit de liens de parenté interdits;

d) En cas de vice rédhibitoire inhérent à l'époux (impuissance, maladie);

e) S'il y a sévices ou mauvais traitements.

39. Le Coran ne condamne pas la séparation par consentement mutuel des époux "Si une femme craint, de son époux, rudesse ou indifférence, nul grief à leur faire s'ils procèdent entre eux à quelque arrangement, car l'arrangement est un bien" [11]. Le *khoul* est l'institution par laquelle le mari répudie son épouse à la demande de celle-ci qui s'engage à lui verser une compensation; il est blâmable, dit Al-Ghazali, que le mari lui réclame plus qu'il n'a donné en dot [12].

La garde des enfants (hadana)

40. En ce qui concerne la garde des jeunes enfants ce sont les femmes qui ont le pas sur les hommes. Dévolue à la mère, la *hadana* passe, si cette dernière venait à faire défaut, aux femmes de la ligne maternelle de préférence. Cependant la mère, d'après l'opinion de plusieurs juristes, perd automatiquement ce droit si elle se marie avec un homme qui n'est pas parent de l'enfant à un degré tel que la garde puisse éventuellement lui être dévolue [13] La personne à qui est dévolue la *hadana* doit veiller à l'entretien et à l'éducation de l'enfant sans en assumer les frais.

Le droit à la contraception

41. Le Coran et les *hadiths* sont émaillés d'exhortations à la procréation Mais ceci n'implique pas que les pratiques contraceptives aient été condamnées par l'Islam La seule qui soit mentionnée dans les textes sacrés est le "coïtus interruptus" ou (*azl*) Les *hadiths* nous apprennent qu'on y avait recours du temps du Prophète et qu'elle aurait reçu son approbation dans certains cas

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fécondes, personnes atteintes de maladies graves ou contagieuses, personnes incapables de faire face aux responsabilités familiales.

43. Quant à l'avortement, il est admis par le même auteur, dans le cas où la vie de la mère se trouverait en danger Au cours des siècles les *Ulémas* se sont penchés sur le problème des pratiques abortives. Cependant la divergence de leurs vues prouve que les textes sacrés permettent des interprétations multiples

[10] F. M. Pareja, *op. cit.*

[11] Voir Coran, Sourate IV, 127/128

[12] Al-Ghazali, *Le livre des bons usages en matière de mariage*, traduction française annotée par L. Bercher et G. H Bousquet, Paris, A Maisonneuve, 1953

[13] L. Milliot, *op cit*

[14] M Chaltout, *op. cit*

19. La durée du droit de *djabr* est variable selon les écoles. Pour les Hanéfites, elle cesse à l'âge de la puberté pour les garçons comme pour les filles. A cet âge, la femme comme l'homme aura le droit de se marier sans avoir besoin de l'autorisation du *wali*; elle pourra conclure son mariage elle-même ou par un mandataire. Pour les Malékites la durée du *djabr* cesse après la puberté au moment de la perte légale de la virginité. Contrairement aux Hanéfites, les Malékites, Chaféites et Hanbalites ne permettent pas à la femme de conclure seule son mariage, même si elle n'est plus soumise au *djabr*; c'est toujours son *wali*, qui la représente après avoir obtenu son consentement, et s'il s'abstient, elle peut s'adresser au juge.

20. La validité du mariage du mineur contracté par le *wali* dépend de l'autorité du *wali*. Le père a une autorité absolue, les autres *wali* ont une autorité restreinte. Si le mariage est contracté par le père de l'enfant (ou le grand-père), il est supposé être conclu dans l'intérêt de l'enfant, aussi reste-t-il toujours valable et irrévocable à moins que le contraire soit prouvé. On justifie cette règle par l'amour et la tendresse du père envers ses enfants. Par contre, s'il est conclu par un *wali* autre que le père, le mariage est révocable à moins qu'il ne soit dans l'intérêt des mineurs. Dans ce cas, même si le mariage est conclu dans les meilleures conditions, l'enfant a, à l'âge de la puberté, l'option de puberté (*khyar alblough*), c'est-à-dire qu'il a le droit de s'adresser au juge pour demander la dissolution du mariage.

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42. Les Etats qui ont inauguré une politique de famille planifiée, l'Egypte en particulier, ont obtenu des docteurs de la Loi, des *fatwas* en faveur de la limitation des naissances. M. Cheltout, Cheikh d'Al-Azhar[14], est en faveur de celle-ci dans les cas suivants · femmes trop [illegible]

43. Quant à l'avortement, il est admis par le même auteur, dans le cas où la vie de la mère se trouverait en danger. Au cours des siècles les *Ulémas* se sont penchés sur le problème des pratiques abortives. Cependant la divergence de leurs vues prouve que les textes sacrés permettent des interprétations multiples.

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[10] F. M. Pareja, *op cit*

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Le statut de la femme en matière successorale

44. Le système successoral musulman est un système original, il ne ressemble ni aux systèmes de l'antiquité ni aux systèmes modernes. Il est différent des coutumes pré-islamiques, souvent contradictoires.

45. Les textes coraniques réglementent la succession d'une façon très détaillée. D'après ces textes la succession est attribuée aux parents des deux côtés. Certains héritiers ont une part fixée, les autres ont le reste. La femme n'est pas exclue de la succession. Les textes lui reconnaissent le droit successoral soit en sa qualité de mère, sœur ou fille. La part qui lui revient est égale à la moitié de celle de l'homme.

46. Il y a toutefois des cas d'exception dans lesquels la part de la femme peut être égale à celle de l'homme: cas des sœurs utérines; cas du père et de la mère se trouvant héritiers avec des enfants mâles.

47. Le Coran favorise ici la mère qui, en Islam, jouit d'une plus grande considération que la femme qui n'a pas d'enfants. Il favorise aussi la veuve en lui accordant une part imposée de l'héritage de son mari (un huitième si le mari a des enfants, un quart à défaut d'eux).

Le statut de la femme en droit pénal musulman

Unicité et diversité des peines suivant le sexe[15]

48. Le droit pénal musulman se caractérise par la division des crimes en deux genres les crimes dits *hudud* (limites du Dieu), les crimes dits *taisir* (faits illicites). Les premiers sont des infractions punies de peines fixées dan le Coran et la *Sunna*: le vol, le brigandage, la fornication, la rébellion, l'usage du vin, l'injure et la diffamation. Les *taisir* sont des faits illicites qui ne constituent pas un crime *hrad*. La peine dans ce cas est laissée à l'appréciation du juge. La réglementation des *hudud* est très rigide tandis que celle des *taisir* est très souple.

49. L'ensemble des *fouqahas* est d'avis que les peines infligées pour le meurtre d'un homme ou d'une femme doivent être les mêmes. Ils s'accordent aussi pour appliquer les mêmes sanctions sans distinction de sexe pour tous les crimes en dehors du meurtre, soit les *hudud* soit les *taisir*.

Le prix du sang (diya)

50. Conscient des méfaits de la vendetta, vengeance illimitée, qui dégénérait souvent en guerre dans l'Arabie préislamique, l'Islam s'est efforcé d'humaniser la justice privée, en lui substituant le talion "principe d'égalité et de proportionalité". Dans le même esprit, il a substitué au talion la compensation légale. Moyennant le prix du sang répandu par l'offenseur, la partie lésée renonce à sa vengeance[16]. C'est le Coran qui consacre la *diya* en imposant son usage pour le meurtre non intentionnel e intentionnel.

51. Le principe ainsi posé devait être réglement dans les détails par le Prophète et l'ensemble des juriste musulmans. Ainsi le montant de la *diya* devait-il varie selon qu'il s'agissait du meurtre d'un homme ou d'un femme, d'un musulman ou d'un non-musulman, d'u adulte ou d'un enfant. Une distinction a également ét établie entre meurtre et lésion corporelle[17]. Plusieur juristes sont d'avis que la *diya* de la femme est équi valente à la moitié de celle de l'homme. Ils posent cett règle par analogie à la part de la femme dans la suc cession. D'autres juristes refusent cette conclusion: l *diya* est une sanction pénale contre le meurtre d'un personne or la femme a une personnalité juridique égal à celle de l'homme, par conséquent sa *diya* doit êtr égale à celle de l'homme; ils ajoutent que la différenc entre l'homme et les femmes dans la succession n'es pas une règle générale[18].

L'adultère ou zina *(fornication)*

52. L'Islam n'a pas de terme pour désigner l'adultèr proprement dit; celui-ci est englobé dans le concept d *zina* ou fornication: "tout acte sexuel tombant sous l coup d'une prohibition divine coranique" selon la défi nition de L. Bercher. C'est le talion le plus important d la religion musulmane.

53. Le même sort est réservé au fornicateur et à l fornicatrice. Mais les peines varient selon qu'elle s'adressent à un coupable *mouhçan* (homme ou femm légalement marié) ou un *non-mouhçan*. Le *mouhçan* encourt la peine de mort par lapidation, peine qui n' pas été prévue dans le Coran mais formulée par l Tradition. Au contraire le *non-mouhçan* est puni de 100 coups de fouets (ou de 50 s'il est esclave).

54. Les preuves de *zina* peuvent être les suivantes premièrement, la grossesse résultant de relations illicites si le mari prouve qu'il n'a pas eu de rapports avec so épouse, dans ce cas, l'époux peut invoquer la théorie d "l'enfant endormi" (2 à 5 ans); deuxièmement, l'aveu que le juge doit tout faire pour éviter, doit être fai quatre fois pour donner le temps non seulement à l réflexion mais aussi à la possibilité de rétractation troisièmement, la preuve par témoignage, à laquelle i est difficile d'avoir recours puisque "la loi exige quatre témoins mâles, pubères, libres, sains d'esprit et digne de confiance".

55. Il serait intéressant de signaler que la prostitution devrait être théoriquement inexistante dans les pays islamiques, d'une part à cause de la structure familiale (polygamie et concubinage), d'autre part à cause du sévère interdit qui frappe le *zina*. Elle a de plus été condamnée dans un verset du Coran " . . . ne forcez pas vos esclaves femmes à la prostitution, alors qu'elles veulent vivre en *muhçana*! Quiconque les force (sera seul coupable)"[19]. La prostitution a été tolérée seulement dans

[15] Pour l'ensemble du problème, voir A. M. Ibrahim. *La peine en droit musulman et dans le Code pénal égyptien*, Thèse, Le Caire, 1944; Abou Zahra, *Le crime et la peine*, Le Caire, 1958.

[16] L. Milliot, *op. cit.*

[17] J. El-Hakim, "La *diya* dans le droit syrien et libanais".

[18] A. M. Ibrahim, *op. cit.*

[19] Voir Coran, Sourate XXIV, 33.

quelques pays mais souvent les autorités locales en ont profité pour lever des taxes sur les prostituées.

56. Nous devons noter aussi que le droit musulman ne connait pas l'institution de l'enfant illégitime. Il ne permet ni la reconnaissance de l'enfant naturel ni sa légitimation.

Principe de la supériorité du témoignage de l'homme dans le cadre de la procédure pénale en droit musulman

57. Pour la plupart des juristes le témoignage de la femme n'est pas admis dans les affaires graves (*hudud*) Elle ne peut pas témoigner dans les affaires relatives à l'Etat. Son témoignage est toutefois admis dans des questions comme celles de l'avortement. Quelques juristes acceptent le témoignage de la femme dans les *hudud* de la même façon que dans les autres cas[20].

58. En dehors de ces cas, le témoignage d'un homme peut être remplacé par celui de deux femmes Ceci serait motivé par la nature sentimentale de la femme qui l'entraîne à imaginer autre chose que la vérité.

59. Des auteurs musulmans contemporains se sont élevés contre ce genre de justification qui n'est plus valable à notre époque: "L'ignorance de la femme à l'époque où elle était soumise à l'homme justifiait sans doute la règle relative à l'infériorité de son témoignage Mais la femme moderne, généralement aussi instruite et évoluée que l'homme ne saurait encore être considérée devant les tribunaux comme inférieure à cet égard à l'homme même illettré[21] "

La femme et la vie publique

60. Rien dans le Coran ou la *Sunna* n'interdit à la femme de participer à la vie publique dans ses différents aspects: politique, administratif, religieux et social.

61. Si la femme a longtemps été tenue dans l'ignorance et l'est encore dans certaines régions, ceci n'a certainement pas de fondement coranique, bien au contraire, un *hadith* affirme qu'il faut donner à la fille les mêmes possibilités de s'instruire qu'au garçon.

La femme et la vie politique

62. Dans l'Arabie préislamique, la femme traitée en objet par certains était digne d'accéder au pouvoir par d'autres L'avènement de l'Islam uniformisa la condition de la femme entre ces extrêmes.

63. Sans l'écarter de la vie politique de la communauté, le Prophète lui a refusé la possibilité d'accéder au pouvoir: "Un pays gouverné par une femme est un malheureux pays" dit un *hadith*. Par contre, il lui a accordé de participer à l'investiture du chef de la Communauté musulmane (*biya'a*) après qu'elle l'eût revendiquée.

64 Tout au long de l'histoire de l'Islam, on trouve des femmes sur la scène politique. Les hommes, un peu partout, se coalisèrent pour reléguer la femme au foyer et l'empêcher de prendre une place importante dans les domaines réservés à l'homme. Ce n'est qu'à partir du début du XX[e] siècle que des modernistes musulmans se sont élevés contre la condition inférieure réservée à la femme. Parmi ceux-ci il faut citer Qassem Amin, Mohammed Abdou, Mohammad Rachid Ridha et l'ensemble de l'école salafiya dont le courant réformiste continue à rayonner.

La femme et la vie administrative

65. On doit distinguer entre les fonctions de souveraineté et les fonctions administratives "Les femmes manquent de jugement et de religion, elles n'ont jamais émis une opinion valable" et "Dieu, par souci de perfection, n'a jamais choisi ses prophètes parmi les femmes". Le *hadith* précité nie à la femme la possibilité d'accéder au pouvoir Les juristes qualifient le ministère, le gouvernement des provinces (*wali*) et le pouvoir judiciaire comme des démembrements du pouvoir suprême, aussi ont-ils dit que toutes ces fonctions sont inaccessibles à la femme Les Hanéfites font une exception pour les fonctions du *qadi* (juge) en disant que la femme peut rendre la justice, comme juge ou arbitre, dans toutes les affaires où son témoignage est admis Pour les fonctions administratives, il n'y a pas de textes qui interdisent à la femme de les occuper Or il est de principe que tout ce [illegible]

que les femmes, dans le passé, ne travaillaient pas en dehors de la maison Mais l'histoire nous rapporte plusieurs exemples de la participation de la femme dans les guerres (*djihad*) Tous les juristes sont d'avis que la femme a le droit de participer à la guerre, cette participation devient un devoir quand l'ennemi envahit un pays musulman, et cela même sans l'autorisation de son mari.

La femme et la vie religieuse

66 Elle peut professer l'Islam comme l'homme et avoir les mêmes récompenses dans l'au-delà Les obligations religieuses de la femme sont en fait celles de l'homme, à la différence que ce dernier peut les accomplir publiquement. Même dans les mosquées les places réservées aux femmes les cachent aux yeux des hommes, tout en leur permettant de suivre la prière La prière, l'aumône, le jeûne et même le pèlerinage[22] ne sont pas interdits à la femme, bien au contraire, ils lui attirent comme à l'homme la miséricorde d'Allah. Mais elle ne peut en aucun cas diriger une prière, c'est une fonction religieuse essentiellement masculine

67. Il ne faut pas oublier non plus que la femme est souvent la cause de l'impureté de l'homme qui l'a approchée. En effet, ce dernier doit alors procéder à des ablutions avant de prier.

[20] A. M. Ibrahim, *op cit.*

[21] Voir M. J Beyham, *La fille de l'Orient dans la civilisation de l'Occident*, Beyrouth, 1952 (en arabe).

[22] A la Mecque, le pèlerinage des femmes s'effectue dans les mêmes conditions que celui des hommes

La femme et la vie sociale

68. La participation de la femme à la vie sociale et son droit au travail sont fonction, d'une part, de son instruction et, d'autre part, de la latitude qu'on lui donne de se mêler aux hommes. Aussi convient-il d'examiner chacune des données de cette importante question.

Le port du voile

69. Il convient tout d'abord de définir cet élément du vêtement féminin dans l'Islam. Ni un objet de parure ni une protection contre la chaleur, la pluie ou le froid, le voile a une fonction quasiment religieuse : couvrir le visage, parfois même le corps tout entier pour les cacher aux hommes qui n'ont pas le droit de les voir. Or, le port du voile n'a été imposé par le Coran qu'aux seules femmes du Prophète : "Quand vous demandez un objet aux (épouses du Prophète), demandez-le de derrière un voile! Cela est plus décent pour vos cœurs et leurs cœurs[23]."

70. Bref, le port du voile a pour but d'éviter à la femme les regards concupiscents de l'homme. Donc "être voilée, c'est être decente". Et le symbolique port du voile pourrait être remplacé par les prescriptions suivantes[24]:

a) Avoir l'ensemble du corps couvert, à l'exception du visage et des mains.

b) La femme doit en outre éviter de se produire dans ses atours (bijoux et vêtements de soie); cette interdiction s'étend aux parfums et au maquillage. Il ne faut pas susciter le désir de l'homme.

c) D'après un autre *hadith*, les femmes qui imitent l'homme ou les hommes qui imitent les femmes ne font pas partie de la communauté.

d) S'abstenir d'imiter les non-croyants.

71. De tout ce qui précède, il ressort que la femme musulmane doit surtout se vêtir de manière discrète et chaste pour ne pas attirer les regards. Quant au port du voile, c'est un comportement social plutôt qu'une obligation religieuse.

L'instruction de la femme musulmane

72. L'instruction de la femme dans une société qui lui impose le voile n'est pas sans poser de problème. Le problème du contenu de l'enseignement offert à la femme se pose avec autant d'acuité que celui du voile.

73. Pour certains, l'instruction dont il est question pour la femme est celle qui consiste à lui enseigner la religion et rien que la religion. Mais ceci n'est fort heureusement pas l'opinion de la majorité des juristes musulmans. Le principe généralement admis, surtout par les modernistes, est en faveur du droit de la femme à l'instruction sous toutes ses formes et à tous les niveaux. Cette tendance est parfaitement justifiée par le fait que le Coran s'adresse particulièrement à des "gens qui savent". La *Sunna*, d'autre part, abonde dans ce sens "Demandez à être instruits, même en Chine." Il ne rest plus à la femme qu'à recevoir cette instruction san enfreindre la loi coranique et ceci par son comportemen digne en face des hommes qu'elle est appelée à côtoye

Le droit de la femme musulmane au travail

74. Le problème du voile est encore plus importan ici que dans le domaine de l'instruction, car le travai amène les femmes à se mêler aux hommes dans tous le secteurs de la vie publique. Ce n'est qu'après une lutt acharnée que la femme avec l'aide des réformistes es arrivée à acquérir ce droit, qui, en fait, ne lui est pa nié par le Coran. Puisque la femme jouit de sa plein capacité financière et que les activités commerciales lu sont permises (exemple de Khadija, femme du Pro phète), elle devrait être autorisée à exercer toutes sorte d'autres activités.

75. Une fois de plus les traditionalistes ont consacré l'usage aux dépens de la loi qui offrait toutes possibilité d'adaptation. Et bien qu'à notre époque la femme ai acquis le droit au travail, des restrictions viennent en entraver l'exercice; par exemple, la femme mariée doi pour pouvoir travailler obtenir la permission de son mari, sinon elle sera considérée comme rebelle (*nachiza*) et privée de la *nafaqua*.

76. De longs siècles de réclusion et d'ignorance on permis à l'homme d'exercer des droits abusifs sur la femme. Fort du principe que c'est lui qui subvient aux frais du ménage, il prétend que la femme n'a aucune raison de travailler. Il faudra encore de nombreuses années pour que ces préjugés soient complètement déracinés dans l'ensemble du monde islamique.

LE STATUT DE LA FEMME MUSULMANE DANS LE DROIT POSITIF: ÉTUDE DES ASPECTS LÉGAUX DE LA CONTRACEPTION ET DE L'AVORTEMENT

77. La première partie de cette étude présente un aperçu des fondements de la loi religieuse musulmane qui inspire directement les législations civiles de la plupart des pays arabes. Ces derniers ont édicté, dès le début de notre siècle, des législations qui réglementent plusieurs aspects du statut personnel. Toutes ces législations sont basées sur le droit musulman dans son ensemble. Le législateur ne se limite pas à l'opinion d'une école déterminée, mais il choisit l'opinion qui s'adapte le mieux aux besoins de la société moderne, quels que soient l'école ou le juriste qui admettent cette opinion. Ceci ressort de la dernière partie de l'étude de M. William Haddad concernant le statut de la femme musulmane dans le droit positif de certains pays arabes de la région.

78. Nous essayerons, dans la suite de cette étude, de voir comment la loi coranique a été interprétée en ce qui concerne la contraception et l'avortement dans cinq pays pris à titre d'exemple.

[23] Voir Coran, Sourate, XXXIII, 53.
[24] Pour tout ce qui suit, voir M. N. Al-Albani, *Le voile de la femme musulmane dans le Coran et dans la Sunna*, Le Caire, Imp. Salafiya, 1943.

Le statut juridique de la femme musulmane au Liban

Le cas de la contraception et de l'avortement

79. Le Liban étant un Etat multi-confessionnel [23], sa constitution reconnaît les différents droits communautaires en matière de statut personnel et successoral, le droit national libanais n'intervenant qu'au niveau des juridictions pénales, publiques et administratives La femme musulmane sera donc soumise au droit musulman pour ce qui est de son statut privé et au droit national dans tous les autres domaines.

80. On désigne sous le vocable de "musulman" au Liban, les communautés sunnite, chiite et druze. L'ensemble des dispositions qui déterminent la condition de la femme dans ces communautés s'inspire largement du droit musulman On notera cependant certaines différences car, en réalité, au niveau juridique, ces trois communautés ont chacune un statut particulier, leurs propres tribunaux, leurs magistrats et le pouvoir de légiférer.

La contraception

81. Plusieurs facteurs contribuent au Liban à une expansion démographique dont les conséquences sont difficiles à prévoir. Le multi-confessionnalisme maintient une certaine mentalité tribale qui consiste à voir dans le nombre un élément de puissance surtout du point de vue électoral.

82. Au Liban, le contrôle des naissances est réglementé par le code pénal (articles 537 et 538) Nulle publicité en faveur de la régulation des naissances n'est autorisée. Les sanctions relatives à l'avortement sont d'autant plus graves qu'il s'agit d'un médecin, d'une sage-femme, d'un droguiste ou d'un pharmacien (articles 539 à 545).

83. L'importation et la vente des produits contraceptifs n'étant permises qu'à des fins médicales (lutte contre la *stérilité*) et non pour la *limitation volontaire* des naissances, les pharmaciens étaient tenus d'exiger jusqu'à une date récente des ordonnances médicales pour les délivrer. Mais ces règlements étaient peu appliqués et en 1969 le Ministère de la Santé rappelait dans une circulaire l'obligation de se conformer aux dispositions prévues par la loi.

84 Cette rigidité au lieu de réduire la vente desdits produits encouragea l'importation frauduleuse de contraceptifs (surtout de provenance égyptienne) Constatant leur échec dans ce domaine et le préjudice subi par les importateurs libanais, les autorités responsables durent réviser leur attitude à ce sujet. D'après des informations recueillies auprès de l'Ordre des pharmaciens, la vente des pilules s'élevait en 1970 à près de 30 000 doses par mois

85. Bien que les articles 537 et 538 du code pénal demeurent toujours en vigueur quant aux sanctions prévues pour la propagande anticonceptionnelle, la vente ou la détention des objets et des produits destinés à empêcher la conception, seules les dispositions concernant la propagande sont appliquées (peines de prison allant d'un mois à un an et amendes de vingt-cinq à cent livres suivant les cas).

L'avortement

86. La loi reste très sévère en ce qui concerne l'avortement la propagande destinée à faciliter les pratiques abortives est punie d'une peine de deux mois à deux ans d'emprisonnement et de cinquante à deux cents livres d'amende (article 539 du code pénal) La même peine est réservée à quiconque aura vendu, mis en vente ou détenu dans le but de mettre en vente, des objets destinés à provoquer l'avortement ou qui d'une manière quelconque en aura facilité l'usage (article 540 du code pénal).

87. La femme coupable d'avortement ou de tentative d'avortement est punie d'une peine d'emprisonnement allant d'un an à trois ans (article 542 du code pénal). Les autres personnes coupables d'avoir provoqué ou tenté de provoquer l'avortement d'une femme, même si cette dernière se révélait ne pas être réellement enceinte, sont passibles d'une peine d'un à trois ans de prison. Cette peine sera de quatre à sept ans de travaux forcés, si les moyens employés entraînent la mort de la femme et de cinq à dix ans, si la mort a été causée par le recours à des méthodes auxquelles la femme n'avait pas consenti

88. Quiconque se livre à des pratiques abortives sur une femme sans son consentement est passible d'une peine minimum de cinq ans de travaux forcés, et de dix ans minimum si la femme meurt des suites de l'avortement (articles 542 à 544)

89. Des circonstances atténuantes sont accordées à la femme qui se fait avorter pour sauver son honneur ou aux membres de sa famille jusqu'au deuxième degré qui l'aident à avorter (article 545)

90 En fait il semble que les pratiques abortives soient courantes au Liban, en particulier dans les milieux aisés, mais la plupart des avortements portés à la connaissance des autorités ne concernent que ceux qui ont eu pour conséquence un décès ou une atteinte grave à la personne.

Le statut juridique de la femme musulmane en Syrie

Le cas de la contraception et de l'avortement

91. La législation syrienne présente de nombreux points communs avec la législation libanaise, les variantes provenant de la différence de structure de populations de ces deux pays La population de la Syrie étant plus homogène que celle du Liban, sa législation l'est aussi. Le code du statut personnel régit toutes les

[23] L'arrêté 60/LR du 10 mars 1936 et ses amendements énumèrent 17 communautés religieuses dont cinq musulmanes; sunnite, chiite ou jaafarite, alaouite, ismaélite et druze et 12 non musulmanes· maronite, grecque orthodoxe, grecque catholique, arménienne orthodoxe ou grégorienne, assyrienne chaldéenne (nestorienne), chaldéenne, latine, évangélique (protestante), arménienne catholique, syriaque orthodoxe, syriaque catholique, israélite

communautés musulmanes et s'étend même aux autres minorités religieuses dans les cas non prévus par leurs propres codes du statut personnel, surtout pour ce qui a trait à la succession. En effet, ces codes ne régissent que les fiançailles, le mariage et ses effets.

92. Les tribunaux *shari'é* sont les seuls compétents en matière de statut personnel pour les musulmans. Les Druzes ont cependant l'avantage d'avoir leur tribunal dont le président est druze, à Soweida dans le Djebel-El-Druze. Quant aux Druzes résidant ailleurs, ce sont les tribunaux *shari'é* du lieu qui sont habilités à trancher leurs conflits aussi bien avec les membres de leur communauté qu'avec les membres d'une autre. Pour ce qui est des communautés non musulmanes, elles ont leurs propres juridictions confessionnelles semblables à celles du Liban. La juridiction civile n'intervient ici qu'en cassation.

93. La législation qui régit le statut personnel des communautés non musulmanes est la même que celle qui existe au Liban et qui date de l'époque du mandat français. Le code du statut personnel applicable aux musulmans étant relativement récent (17/9/1953) il ne fait en principe pas de différence entre alaouites, sunnites et druzes. Dans ce domaine, la Syrie à la différence du Liban a rompu avec la législation ottomane, tout en gardant ses fondements d'origine inspirés du droit musulman.

94. La *Shari'a* demeure en Syrie la première source de droit, après les lois, elles-mêmes conformes à l'esprit de l'Islam. Ces lois ne sont d'ailleurs que des interprétations modernes de la *Shari'a*, répondant aux exigences de notre époque.

La contraception

95. La population syrienne demeure dans son ensemble traditionaliste et conservatrice; l'influence occidentale y est faible. La minorité formée par les modernistes et les tenants du laïcisme, quoique très active, se heurte à une forte majorité qui reste très attachée aux enseignements du passé. Des considérations d'ordre religieux, moral et politique militent en faveur d'une natalité élevée.

96. La vente des pilules et autres produits contraceptifs est autorisée sur le marché syrien, en dépit des restrictions légales qui la limitent à des causes thérapeutiques. La quantité de produits vendus est beaucoup trop importante pour avoir été utilisée à des fins uniquement thérapeutiques; d'après les renseignements communiqués par les services compétents, il y aurait entre 25 000 et 30 000 femmes syriennes qui emploieraient les pilules[26]. En outre, les produits anticonceptionnels permettant d'éviter les maladies vénériennes sont légalement vendus. Quant aux produits strictement contraceptifs (les spermicides par exemple) ou bien entendu abortifs, ils sont strictement prohibés[27].

97. L'interdiction de principe imposée par le code pénal ne concerne pas uniquement les produits mais s'étend aussi à la publicité faite en leur faveur; toutefois pour être réprimée, celle-ci doit être publique et tendre à répandre et à faciliter l'usage de ces produits, sinon elle ne fera l'objet d'aucune poursuite. Un débat scientifique ou politique ou même une conversation à ce sujet ne tombent pas sous le coup de la loi[27].

L'avortement

98. Comme la contraception, l'avortement est légalement toléré lorsque des impératifs médicaux le prescrivent. Ainsi l'article 523 du code pénal autorise l'avortement thérapeutique alors que l'article 525 du même code prévoit des sanctions graves pour l'avortement criminel.

99. En fait, les avortements criminels ne sont portés à la connaissance des autorités que lorsqu'il en résulte un décès ou une atteinte grave à la personne qui subit l'opération abortive. Ceci explique le nombre réduit des procès relatifs à l'avortement examinés par les tribunaux syriens.

100. L'avortement thérapeutique n'est autorisé que si la vie de la mère est en danger. En vertu de l'article 47 du décret n° 1 du 5 janvier 1970, il doit respecter les règles suivantes :

1) L'avortement doit être effectué par un médecin spécialisé et être approuvé par un autre médecin.

2) Un rapport doit être rédigé avant l'opération pour en démontrer la nécessité absolue.

3) Les quatre copies dudit rapport doivent être signées par les médecins, l'intéressée, son mari ou son *wali*. Une copie sera remise à la famille et à chacun des médecins.

101. Ces dispositions sont venues renforcer celles du code pénal à la suite de la multiplication des avortements qui ont dernièrement alerté les autorités. Des mesures strictes sont d'ailleurs prises à l'égard des contrevenants. Tout membre du corps médical ayant pratiqué un avortement illégal sera condamné par un arrêté du Ministre de la Santé à ne pas exercer sa profession durant au moins un an. Cette sanction s'ajoute à celles prévues par le code pénal. En cas de récidive le contrevenant sera rayé de l'Ordre des Médecins et son diplôme lui sera retiré (article 50 du décret n° 2 du 5 janvier 1970).

Le statut juridique de la femme musulmane en Irak : le cas de la contraception et de l'avortement

102. Le statut de la femme irakienne présente beaucoup de points communs avec celui de la femme syrienne. On peut sans doute attribuer ceci à l'identité idéologique des systèmes politiques en vigueur dans ces deux pays. La *Shari'a* demeure la première source de législation.

103. En ce qui concerne l'avortement, les lois et les règlements (article 417 à 419 du code pénal) en vigueur en Irak sont similaires à ceux des autres pays de la

[26] Service commercial de la Société Pharmex, Damas.

[27] J. El-Hakim, *op. cit.*

région L'avortement n'est autorisé que pour des raisons thérapeutiques notamment si la vie de la mère est en danger.

104. Le code pénal ne contient pas de références précises à l'utilisation des contraceptifs, aussi la vente des pilules et autres produits anticonceptionnels est-elle pratiquement libre.

105. L'établissement d'un centre de planning familial a été autorisé à la fin de 1969. Il a commencé ses activités en 1970 à l'Hôpital de Karakh à Baghdad. Il a pour but la sauvegarde de la santé de la mère et de l'enfant. Son action ne s'insère pas dans le cadre d'une politique nationale de limitation des naissances mais plutôt dans celui de l'amélioration du bien-être de la famille.

Le statut juridique de la femme musulmane au Koweït : le cas de la contraception et de l'avortement

106. La femme koweïtienne semble jouir d'une position privilégiée parmi les autres femmes arabes. Il est important de noter, au sujet du statut juridique de la femme au Koweït, que ce pays reste fidèle aux traditions juridiques musulmanes.

107. En dépit de la diffusion de la civilisation européenne dans ce pays, le droit musulman y reste la loi fondamentale non seulement en ce qui concerne les statuts personnels, mais aussi à l'égard d'une partie importante des statuts réels Le droit civil appliqué au Koweït est la *Nadjalla*, codification ottomane des opinions de l'école hanéfite. C'est un exemple très intéressant de l'adaptation des règles musulmanes aux exigences de la société moderne.

108. L'avortement est sévèrement puni par le code pénal (articles 174 à 177) koweïtien: dix ans de prison à toute personne jugée coupable de ce crime. Quant à ceux qui disposent ou procèdent à la vente de produits abortifs avec préméditation, ils sont passibles d'une peine de trois ans de prison et 3 000 roupies (225 dinars koweïtiens ou 630 dollars des Etats-Unis).

109. Pour ce qui est du contrôle des naissances le Koweït s'est rangé du côté des auteurs musulmans qui ont admis sa légitimité La vente des produits contraceptifs est libre au point d'outrepasser l'arrêté du Ministère de la Santé imposant une ordonnance médicale pour l'utilisation desdits produits. Cependant leur vente ne touche qu'un nombre réduit de familles : leur dissémination est limitée par les résistances traditionnelles aussi bien que par certains facteurs économiques (coût des produits contraceptifs). On doit rappeler en outre que si le pays compte près de 750 000 habitants, plus de la moitié est d'origine étrangère et il n'existe pas, au niveau national, de conscience d'un problème de surpopulation

110. L'utilisation des produits contraceptifs est en fait limitée à une fraction de la population : étrangers résidant au Koweït, et jeunes couples koweïtiens, soit étudiants ayant intérêt à terminer leurs études universitaires avant d'avoir des enfants, soit jeunes ménages adoptant les mesures occidentales en ce qui concerne le nombre d'enfants.

111. Enfin l'article 59 du code pénal de 1960 stipule que la femme enceinte condamnée à mort qui met au monde un enfant vivant verra sa peine commuée en emprisonnement à vie

Le statut juridique de la femme musulmane en Arabie Saoudite le cas de la contraception et de l'avortement

112 En matière de système juridique, l'Arabie Saoudite constitue un cas particulier puisque la *Sharī'a* reste la loi fondamentale de ce pays et qu'elle y est appliquée dans toute son intégrité. Cet attachement à la loi fondamentale est renforcé par le *Wahhabisme*, doctrine officielle du royaume Dans cette doctrine le pouvoir politique revêt la forme d'une sorte de théocratie où le souverain, autorité suprême, est également le chef religieux de la communauté, l'*Imam* Maître du pouvoir exécutif comme du pouvoir législatif, il délègue son autorité à ses juges qui sont des *cheikhs* initiés au droit musulman. Il n'existe donc pas de tribunaux civils ou autres Le statut personnel de la femme est, par le fait même, régi par la loi coranique et il suffira de se référer au chapitre relatif au statut de la femme en droit musulman.

113. Il est intéressant d'étudier l'attitude de l'Arabie Saoudite à l'égard du problème de la limitation des naissances En fait, sans publicité excessive à ce propos, les produits anticonceptionnels sont vendus librement sur le marché. Cette situation résulte d'une décision prise par le Ministre des Finances, décision permettant à la direction de la douane d'autoriser l'importation de ces produits. Cette décision est d'autant plus intéressante qu'il s'agit d'un pays qui ne souffre pas d'une forte densité de population et qui se montre d'une grande intransigeance dans le domaine de l'application de la loi coranique. Ce serait une preuve de plus que l'Islam le plus orthodoxe n'est pas hostile à la limitation volontaire des naissances Cette attitude a soulevé bien des remous dans les milieux conservateurs mais les autorités ont estimé qu'il était bon de laisser les gens libres de leur décision. Nous ne possédons malheureusement pas de chiffres relatifs à l'utilisation de ces produits en Arabie Saoudite, mais il semble que leur usage soit relativement courant dans les classes aisées de la société urbaine.

114. Quant à l'avortement, il reste prohibé, à l'exception de l'avortement thérapeutique qui doit être décidé par une commission médicale. L'avortement volontaire est certainement pratiqué, mais il est difficile de donner des chiffres puisque seuls, les cas de décès et d'accidents qui en résultent sont connus.

ANNEXE

Glossaire des termes arabes[a]

	Terme		Définition
A.	Allah	:	Dieu
	Ahl al-sunna	:	les orthodoxes
	Aila	:	serment de continence
	Amal	:	jurisprudence
	Ayat	:	verset du Coran
B.	Biya'a	:	acte d'investiture
C.	Coran	:	livre sacré de l'Islam
D.	Diya	:	prix du sang
	Djabr	:	contrainte matrimoniale
F.	Faqih	:	juriste, légiste
	Fatwa, fatawi	:	avis doctrinal, consultation juridique
	Fiqh	:	interprétation de la *shari'a*, science du Droit
	Fouqaha	:	juristes, légistes
H.	Hadana	:	droit de maternité, garde de l'enfant
	Hadith	:	tradition, conduite, comportement de Mahomet
	Hudud, hrad	:	peines fixées par la loi
I.	Idjmaa	:	accord législatif, assentiment de la communauté
	Idjtihad	:	création de la règle de droit
	Imam	:	fondateur de rite — successeur spirituel et temporel de Mahomet chez les chiites
	Islam	:	ensemble des peuples musulmans, acte de soumission à Dieu
K.	Katb el kitab	:	signature du contrat
	Khoul	:	institution par laquelle le mari répudie son épouse à la demande de celle-ci qui s'engage à lui verser une compensation
	Khutba	:	fiançailles
	Kufr	:	hérésie, mécréance
M.	Mahr	:	dot maritale obligatoirement et uniquement donnée par le mari à sa femme
	Mahr al-mithl	:	dot de parité ou d'équivalence
	Mouhçan	:	fornicateur (ou fornicatrice) légalement marié(e)
	Mudjtahid	:	juriste, théologien ayant le pouvoir d créer la norme juridique, législateu
N.	Nachiza	:	femme rebelle
	Nafaqua	:	entretien de l'épouse
	Nikah	:	union légale, mariage et concubinag
O.	Orf	:	coutume
Q.	Qadi	:	juge
	Qanoun	:	ordonnance, décret
	Qiyass	:	déduction analogique
	Qur'an	:	livre saint
R.	Ra'y	:	rationalisme, jugement humain
S.	Shari'a	:	loi formelle, écriture sainte, Coran e *Sunna*
	Sunna	:	conduite du Prophète, ensemble de hadiths, orthodoxie
	Sourate	:	chapitre du Coran
T.	Tafsir	:	explication, commentaire du Coran
	Taisir	:	faits illicites
	Taqlid	:	conformisme, imitation
	Talqq	:	répudiation
	Ta'wil	:	science ésotérique de l'interprétation
U.	Umma	:	communauté mère de l'Islam, l'Eta musulman, la communauté musulmane
	Usul	:	principes, fondements
W.	Wali	:	mandataire, tuteur testamentaire ou matrimonial
Z.	Zina	:	fornication

[a] Etabli d'après L. Milliot, *Introduction à l'étude du droit musulman*, Paris, Sirey, 1953.

LES DROITS DE L'HOMME ET LA MORTALITÉ *

Ion Filipescu **

1. Les droits de l'homme sont conçus comme droits fondamentaux humains[1] ou bien comme droits minimums d'un être humain[2]. L'application des droits de l'homme tient de la compétence intérieure des Etats, domaine où l'Organisation des Nations Unies ne peut pas intervenir, sauf s'il est question d'une situation susceptible de mettre en péril la paix et la sécurité internationale (Art 2, par. 7 de la Charte des Nations Unies)[3] La violation des droits de l'homme ressort de la compétence de l'Organisation internationale dans certains cas et seulement à certaines conditions[4]. Il y a des actes internationaux, par exemple la Convention de sauvegarde des droits de l'homme et des libertés fondamentales[5], qui réglementent la protection internationale de ces droits[6].

2. Les Etats se trouvent à différents stades de développement économique, social et politique. Il y a même des peuples qui n'ont pas encore acquis leur indépendance politique et économique. Dans certains Etats, la discrimination raciale est pratique courante En pareille situation, l'application et la protection des droits de l'homme varie forcément d'un pays à un autre

3. L'inégalité économique et sociale à l'intérieur de certains pays affecte aussi sérieusement l'utilisation et l'exercice des droits de l'homme. Dans certains pays, la situation de ces droits est composée de beaucoup d'éléments dont nombre ne sont pas des problèmes de droit, la constitution pouvant être seulement l'un des éléments de la situation[7] Etant donné qu'actuellement le monde est hétérogène au point de vue politique, économique et social, la protection des droits de l'homme ne peut être uniforme[8] Le droit — tout comme l'Etat — est déterminé, quant au fond, par le fondement économique de la société, par les relations de production qu'il reflète[9]. Pour assurer une protection effective des droits de l'homme dans tous les pays, il est nécessaire donc d'éliminer le décalage entre les pays développés et ceux en voie de développement, comme aussi les différences économiques et sociales existantes entre les catégories sociales de certains pays Une telle œuvre donnera un contenu réel, effectif, aux droits de l'homme, dans tous les pays et pour tous les hommes

4 La mortalité est l'un des phénomènes démographiques les plus importants Jusqu'à certains niveaux, la mortalité est révélatrice de l'amélioration des conditions socio-économiques et sanitaires d'un pays D'autre part, les niveaux élevés de morbidité et mortalité constituent des obstacles à un développement rapide et soutenu[10] La mortalité a un rôle important dans la formation et la structure de la population d'un pays C'est pourquoi, parallèlement à une fertilité élevée la diminution de la mortalité est l'un des facteurs qui contribue à la croissance de la population

5. Les droits de l'homme et la mortalité se conditionnent, dans une certaine mesure, réciproquement Cette relation est complexe D'une façon schématique, nous pouvons en mentionner quelques aspects significatifs Ainsi, l'exercice des droits de l'homme mène à la diminution de la mortalité et au retardement de celle-ci, dans le sens de l'augmentation de l'espérance de vie. Par contre, si le droit à la vie n'est pas juridiquement garanti, dans le sens que la peine capitale peut être appliquée dans des cas où elle ne se justifie pas et si les conditions qui évitent des condamnations sans faute grave n'existent pas, cela peut conduire à la croissance de la mortalité et, par conséquent, à la réduction de la durée de la vie Le décès d'une personne peut être provoqué aussi par des criminels qui tuent ou qui

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[illegible] par I Demeter, [illegible] *Bucarest, Editura* [illegible]

[illegible] Paris, Sirey, [illegible]

[3] Voir A Bolintineanu, "Tendance d'instituer de nouvelles procédures dans le domaine des droits de l'homme", *Etudes et recherches juridiques*, Bucarest, n° 1, 1970, p 180 à 183

[4] Voir I Vintu et V Duculescu, "Le rôle des réglemen- [illegible]

[illegible] le 3 septembre 1963 (Nations Unies, *Recueil des Traités*, vol 213, 1963, n° 2889)

[6] Voir Milena Srnská, *The Protection of Human Rights in International Law*, CSC, 1973, p 28 à 41, A. H Robertson, [illegible]

[illegible] Oxford, [illegible] *on World* [illegible] *rld Peace* [illegible] Bucarest, [illegible] *et choses*, [illegible] de pl [illegible] 12

portent atteinte à l'intégrité de la personne. C'est pourquoi les garanties juridiques des droits à la vie signifient aussi la création de conditions qui assurent la sauvegarde de l'être humain, des attributs de la personnalité et de ses droits et libertés contre pareils faits socialement dangereux. Selon une opinion [11], l'inviolabilité de la personne comprend non seulement le droit à la liberté, mais aussi le droit à la vie et à l'intégrité personnelle; d'après une autre opinion [12], le droit à la vie est protégé par tous les droits fondamentaux énoncés dans la constitution. En outre, dans la mesure où la mortalité dépend du niveau de vie et de l'assistance sanitaire, ce qui suppose le droit à l'alimentation, au logement, aux conditions de travail, aux soins médicaux, c'est-à-dire le droit à un certain confort socio-économique et médical, les droits de l'homme influencent directement la mortalité et contribuent à la croissance de la durée de la vie humaine [13]. En conséquence, les programmes nationaux pour la réduction de la mortalité doivent contenir aussi les mesures en faveur de la santé, de l'alimentation et autres éléments de confort social [14].

6. A son tour, la mortalité influence les droits de l'homme. Dans la mesure où une mortalité élevée peut être un obstacle au développement socio-économique, elle enfreint la création de facteurs assurant l'exercice effectif des droits de l'homme. La diminution de la mortalité contribue à la croissance de la population et à l'augmentation de l'espérance de vie à la naissance et à différents âges. La croissance de la mortalité aura un effet contraire sur le droit à la vie. L'espérance de vie augmente d'autant plus que la diminution de la mortalité se réalise en priorité parmi les jeunes et surtout parmi les enfants. La diminution de la mortalité signifie, du point de vue économique, que l'investissement fait par la société pour l'éducation et la formation professionnelle d'une personne se récupère et qu'il existe la possibilité que chaque personne contribue au développement de la société durant une période de temps plus grande. Les démographes montrent que la diminution ou la croissance de la mortalité influencent la fertilité. L'intervention de la mort met fin au droit à la vie de la personne en cause. Le rapport entre la mortalité et les droits de l'homme pourrait être considéré aussi sous cet aspect.

LE DROIT À LA VIE

7. Le droit à la vie est expressément ou implicitement prévu dans plusieurs documents internationaux [15]. Ce droit peut être pris dans deux sens [16]:

a) Le droit de ne pas être tué, de ne pas être arbitrairement condamné à mort ou à exécution. En général, ce droit est considéré par rapport à l'Etat qui exerce le droit de condamner à mort et d'exécuter une telle décision. Mais la mort peut être provoquée par des membres de la société, notamment en cas d'assassinat. Pour sauvegarder le droit à la vie et empêcher les faits qui lui portent atteinte, l'Etat incrimine les faits qui portent atteinte à l'existence et à l'intégrité de l'être humain, qu'il déclare comme infractions;

b) Le droit de vivre, comprend notamment le droit à l'alimentation, à l'habillement, au logement et aux soins médicaux qui représentent les facteurs réduisant et retardant la mortalité, dans le cas où le droit à la vie est assuré dans le premier sens. Par la diminution de la mortalité on réalise le prolongement de la vie, donc le droit de vivre.

8. En général, le droit à la vie est utilisé dans le premier sens lorsqu'on a en vue les droits civils et politiques de l'homme et dans le deuxième sens lorsqu'on se réfère aux droits économiques, sociaux et culturels.

9. Le droit à la vie est le fondement de tous les autres droits de l'homme, dans le sens que sans celui-ci on ne peut poser le problème des autres. Le droit à la vie, le droit à la liberté et le droit à la sécurité personnelle sont des droits élémentaires de l'homme. Chaque personne a droit à la vie. L'étranger jouit du droit à la vie, à la liberté et à la sécurité personnelle, avec toutes les conséquences découlant de ce droit (art. 1 et 3 de la Déclaration universelle des droits de l'homme). Les droits élémentaires, y compris le droit à la vie, sont reconnus aussi dans la Déclaration des droits de l'enfant de 1959, sans aucune distinction. Le malade mental jouit du droit à la vie comme toute autre personne. (Déclaration des droits du déficient mental adoptée par l'Assemblée générale des Nations Unies, le 20 décembre 1971). L'extermination des handicapés ou des malades mentaux motivée par le fait que leur maladie

[11] Voir N. Prisca, *Le droit constitutionnel*, Bucarest, 1969, p. 249.

[12] Voir I. Moraru, *Le droit constitutionnel*, Bucarest, 1973, p. 101.

[13] Voir *L'analyse démographique des tendances et niveaux de la mortalité* (Séminaire interrégional sur l'analyse de la mortalité, Mamaia, Roumanie, 20 septembre-3 octobre 1972, (ESA/P/AC.2/2), p. 19 et 20.

[14] Voir rapport du Secrétaire général sur le projet de plan d'action mondial de la population (E/CN.9/292), p. 13.

[15] Parmi ceux-ci : la Déclaration universelle des droits de l'homme du 10 décembre 1948, art. 3; le Pacte international relatif aux droits civils et politiques, en date du 16 décembre 1966, art. 6; le Pacte international relatif aux droits économiques, sociaux et culturels, en date du 16 décembre 1966, art. 11 et 12; la Déclaration des droits du déficient mental, en date du 20 décembre 1971, art. 1, 2, 3 et 7; le Statut du Tribunal militaire international de Nuremberg, art. 6; la Convention pour la prévention et la répression du crime de génocide, en date du 9 décembre 1948, art. II; la Déclaration des droits de l'enfant, en date du 2 novembre 1959, art. 2, 4, 5 et 9; la Convention internationale sur l'élimination de toutes les formes de discrimination raciale, en date du 4 janvier 1969, art. 5; la Déclaration sur le progrès et le développement dans le domaine social, en date du 11 décembre 1969, art. 10, 18 et 19; la Convention de sauvegarde des droits de l'homme et des libertés fondamentales, en date du 4 novembre 1950, art. 2; la Convention interaméricaine des droits de l'homme, art. 4; la résolution 2676 (XXV) de l'Assemblée générale du 9 décembre 1970 sur la protection des civils en temps de guerre; les Conventions de Genève du 12 août 1949 pour la protection des victimes de la guerre; la Convention de Vienne sur le droit des traités, en date du 27 mai 1969, art. 60, point 5.

[16] Voir Vernon van Dyke, *Human Rights, The United States and World Community*, New York, Oxford University Press, 1970, p. 9 et 10.

est incurable, ou à des fins eugéniques, a été considérée comme crime de guerre ou crime contre l'humanité [17]. Le droit à la vie fait partie intégrante de l'être humain et on ne peut renoncer à ce droit. L'exercice du droit à la vie implique le droit à une alimentation adéquate, au logement, à la santé et à l'éducation La réduction de la mortalité conduit à la croissance de l'espérance de vie. Celle-ci est en relation inverse avec la durée de la vie [18]. Le droit à la vie fait partie de la catégorie des droits personnels non patrimoniaux liés à l'existence physique de l'individu Ces droits sont absolus, dans le sens qu'ils sont opposables à tous les autres et intransmissibles, ce qui explique aussi l'impossibilité de renoncer au droit à la vie. Les lois pénales nationales considèrent comme infractions les actions contre la vie, tel le meurtre, l'infanticide, le suicide ou l'encouragement au suicide. Certaines législations nationales incriminent aussi les actions qui, par les conditions créées ou les effets qu'elles produisent, peuvent mettre en danger la vie d'une personne ou mettre fin à sa vie, par exemple les mauvais *traitements infligés aux mineurs.*

10. A l'occasion des discussions engagées lors de l'adoption de l'article 3 de la Déclaration universelle des droits de l'homme et de l'article 6 du Pacte international relatif aux droits civils et politiques, s'est posée la question de déterminer le moment à partir duquel commence le droit à la vie et quand il cesse. Juridiquement, la personnalité ou la qualité de sujet de droit commence à la naissance et, quand il s'agit des droits de l'enfant, à l'instant même de la conception, conformément au principe "*infant conceptus pro nato habetur quoties de commodis ejus agitur*". A condition qu'il naisse vivant ou, dans certaines réglementations, viable, l'enfant conçu peut acquérir des droits. Pareillement, on a proposé que les textes mentionnés précisent que le droit à la vie commence au moment de la conception [19]. Cette proposition n'a pas été acceptée. En effet, l'article 3 de la Déclaration universelle des droits de l'homme prévoit seulement que chaque individu a droit à la vie, à la liberté et à la sécurité de sa personne, et l'article 6, paragraphe 1, du Pacte international relatif aux droits civils et politiques dispose que le droit à la vie est inhérent à la personne humaine, qu'il est protégé par la loi et que personne ne peut être arbitrairement privé de la vie D'autre part, la Déclaration des droits de l'enfant, en date du 2 novembre 1959 [résolution 1386 (XIV) de l'Assemblée *générale* des *Nations Unies*] se rapporte à de pareils droits qui doivent être reconnus aux enfants, sans aucune exception, sans aucune discrimination. Du contenu des textes il ressort que l'on envisage l'enfant né. Quant il s'agit du droit à un nom et à la qualité de citoyen (principe 3), on précise même que ceux-ci existent dès la naissance. Donc, à la lumière des documents internationaux mentionnés, on acquiert le droit à la vie à l'instant même de la naissance Cette solution est conforme au point 16 de la Proclamation de Téhéran du 13 mai 1968, selon lequel "Les parents ont le droit fondamental de déterminer librement et consciemment la dimension de leur famille et l'échelonnement des naissances" [20]. On trouve une formulation identique dans l'article 16 de la Déclaration sur le progrès et le développement dans le domaine social, en date du 11 décembre 1969 [résolution 2542 (XXIV) de l'Assemblée générale des Nations Unies]

11 Par contre, dans la Convention interaméricaine des droits de l'homme, on prévoit que le droit à la vie commence au moment de la conception [21]

12 Le droit à la vie avant la naissance ne peut être considéré en dehors des dispositions légales réglementant l'avortement et spécialement celles qui l'incriminent. En effet, dans la mesure où la loi permet l'avortement, il ne serait pas question de parler du droit à la vie à partir du moment de la conception ou pendant la conception Par contre, lorsque la loi ne permet pas l'avortement, on peut parler du droit à la vie du fœtus et les atteintes qui lui sont portées sont sanctionnées par la loi

13 Quand l'avortement a un caractère d'infraction [22], l'objet matériel de la protection pénale est constitué par le produit de la conception (le fœtus), dénommé parfois — dans la littérature juridique — personne en formation En prévoyant que l'avortement est en soi une infraction distincte, la loi pénale a tenu compte du fait qu'il est nécessaire d'assurer la réalisation de naissances normales et de la vie humaine Cette loi exprime aussi l'équilibre entre le droit de naître et le droit de la femme à disposer librement de son corps [23].

14. Il n'existe pas de recommandations internationales concernant l'avortement et l'adoption de telles mesures n'est pas désirable.

15. On peut tirer au moins deux conclusions.

a) La réglementation légale concernant l'avortement peut aider à déterminer le moment à partir duquel commence le droit à la vie avant la naissance;

b) L'incrimination de l'avortement signifie, dans certaines conditions, la protection du droit à la vie du fœtus par des moyens de droit pénal.

16. L'avortement doit être envisagé aussi du point de vue de la natalité, de la santé de la mère et des enfants à naître de la même mère, de l'égalité fonda-

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[illegible]

SYM N/3/Add 1) p 3

[20] Voir *Acte final de la Conférence internationale des droits de l'homme*, Téhéran, 22 avril-13 mai 1968 (publication des Nations Unies, nº de vente F 68.XIV 2) p 5

[21] Voir Vernon van Dyke, *op cit.*, p 10.

[22] Voir Vintilă Dongaroz, *Explications théoriques du Code pénal roumain*, Ed Academiei, 1971, tome III, p 251 et 252

[23] Voir Organisation mondiale de la santé, *La législation [illegible] l'avortement dans le monde : aperçu des lois [illegible] vigueur*, Genève, 1971, p 5 et 6

mentale des êtres humains. L'avortement dans certaines conditions équivalant à un génocide doit être condamné.

17. La question concernant le moment à partir duquel commence le droit à la vie a été posée aussi en pratique. Ainsi, conformément à l'article 2 de la Convention de sauvegarde des droits de l'homme et des liberté fondamentales, un ressortissant norvégien a soutenu que la loi du 12 octobre 1960, qui autorise l'interruption de la grossesse dans certaines circonstances, viole le droit à la vie garantie par ladite convention européenne[24]. Le requérant a demandé à la Commission européenne de répondre à la question de savoir si le droit à la vie, reconnu à l'homme, s'applique aussi à l'embryon humain et, sinon, à partir du quel stade de son développement il jouit, partiellement ou totalement, de ces droits. La demande a été déclarée inadmissible, n'étant pas conforme à l'article 25 de la Convention, le requérant ne prétendant pas que lui-même est la victime de la loi incriminée et la Commission n'ayant pas la compétence d'examiner abstraitement la conformité de ladite loi avec les dispositions de la Convention.

18. Le droit à la vie cesse avec le décès de l'individu. Les causes du décès peuvent être diverses. Parfois, le droit à la vie est refusé à certaines personnes, dénommées malfaiteurs par certains auteurs[25]. Il y a des auteurs qui considèrent qu'aucun Etat ne peut garantir à ses sujets le droit à la vie[26]. Les lois pénales nationales peuvent prévoir la peine capitale. La question de la légitimité de la peine capitale[27] a provoqué de vives discussions depuis toujours, mais surtout au dix-huitième siècle, depuis que Cesare Baccaria, et ensuite l'école classique pénale avec son représentant Francesco Carrara, avaient soutenu que cette peine est sujette à critique de plusieurs points de vue. On a invoqué des arguments aussi pour soutenir la peine capitale. Les lois pénales nationales ont prévu les cas et les conditions dans lesquelles on peut appliquer la peine capitale.

19. A propos de la peine capitale il faut considérer encore un autre aspect. Ainsi, dans la mesure où les lois pénales considèrent comme infractions punies de la peine capitale certains actes socialement dangereux et portant atteinte au droit à la vie, elles défendent par des moyens pénaux, le droit même à la vie. La qualité d'exemple de cette peine constitue un facteur qui empêche les actions pouvant mettre fin à des vies humaines.

20. Les expériences médicales sur des sujets humains, y compris la transplantation des organes, posent des questions juridiques et morales qui exercent leur influence sur le droit à la vie.

21. Les guerres ayant pour but d'acquérir des territoires étrangers, de subjuguer et de piller les autres peuples, d'étouffer la lutte de libération nationale et sociale des peuples, constituent une négation du droit à la vie[28]. Aussi la guerre en tant que moyen d'apporter une solution aux différends internationaux est-elle interdite par le droit international[29].

22. Contrairement à ce qui se passait dans le passé, les parties à un conflit sont obligées de respecter, pendant la guerre, les règles de conduite consacrées par les lois et les coutumes. Pour la défense des droits de l'homme, et en premier lieu du droit à la vie, il est nécessaire de prendre d'une manière résolue toutes les mesures et d'accomplir toutes les actions de nature à prévenir la guerre et à l'éliminer définitivement de la société.

23. Pour le jugement des principaux criminels de guerre de la puissance européenne de l'Axe, le Tribunal militaire international de Nuremberg a été constitué aux termes de l'Accord de Londres du 8 août 1945, le Statut de ce tribunal portant la même date.

24. Conformément à l'article 6 du Statut, les personnes qui ont commis, individuellement ou en tant que membre d'une organisation, l'un des crimes définis dans ledit article, ont été jugées et punies : *a*) crime contre la paix, *b*) crime de guerre, *c*) crime contre l'humanité.

25. L'Assemblée générale des Nations Unies a réaffirmé ces règles aux termes de sa résolution 95 (I) du 11 décembre 1946.

26. Le 26 novembre 1968, l'Assemblée générale a adopté, par sa résolution 2391 (XXIII), la Convention sur l'imprescriptibilité des crimes de guerre et des crimes contre l'humanité.

27. L'*apartheid* et sa politique d'agression constituent une grave menace contre la paix et la sécurité internationale[30]. En même temps, ils constituent un péril pour les droits de l'homme, y compris le droit à la vie. L'accomplissement des droits des peuples à l'autodétermination et à la décolonisation a une grande importance pour l'exercice des droits de l'homme[31].

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[24] Voir *Répertoire de la jurisprudence relative à la Convention européenne des droits de l'homme, 1955-1967*, Editions administratives, U.G.A, S.A., Heule, Belgique, p. 9.

[25] Voir Evan Luard, *The International Protection of Human Rights*, Conclusions, Londres, Thames and Hudson, 1967, p. 313.

[26] Voir C. Ezejiofor, *Protection of Human Rights under the Law*, Londres, Butlerworths, 1964, p. 50.

[27] Voir Teodor Vasiliu, *Le Code pénal en Roumanie*, Ed. Stiintifică, 1972, p. 390 et 391; Vintilă Dongaroz, *Explications théoriques du Code pénal roumain*, Ed. Academiei, 1970, tome II, p. 24 et 25.

[28] Selon des calculs effectués par un savant suisse, dans les derniers 5 500 ans il y a eu 14 500 guerres, qui ont fait périr 3 640 000 000 d'hommes. (V. A. Romanov, *Iskliucenie voinî iz jizni obscestva*, Moscou, 1961, p. 12; Grigore Geamănu, *Droit international contemporain*, Bucarest, Editura Didactica si Pedagogică, 1965, p. 710 et 711).

[29] Le Pacte Briand-Kellog (1928) est le premier document international visant à interdire la guerre comme moyen de résoudre les différends internationaux. La Charte des Nations Unies prévoit que l'interdiction de la guerre d'agression est un principe fondamental du droit international.

[30] Voir *Rapport du Secrétaire général sur l'activité de l'Organisation, 16 juin 1972-15 juin 1973* [*Documents officiels de l'Assemblée générale, vingt-huitième session, Supplément nº 1* (A/9001)], p. 16.

[31] A l'article 7 de la Convention de Vienne sur le droit des traités, en date du 23 mai 1969, il est fait mention des principes de droit international contenus dans la Charte des Nations Unies, tel le principe de l'égalité en droits et de l'autodétermination des peuples et le principe du respect universel et effectif des droits de l'homme et des libertés fondamentales pour tous. (C. Comorovschi, V. Duculescu, "Interdiction de la discrimination raciale dans le droit international", *Revue Roumaine d'études internationales*, Bucarest 2 décembre 1951, p. 56).

28. L'Assemblée générale des Nations Unies a condamné, par ses résolutions 2184 (XXI) du 12 décembre 1966 et 2202 (XXI) du 16 décembre 1966, la violation des droits économiques et politiques des populations autochtones ainsi que la politique d'*apartheid*, les considérant comme crimes contre l'humanité.

29. Le génocide est une grave atteinte portée au droit à la vie, parce qu'il consiste dans l'extermination de groupes de population considérés d'après des critères de race, de nationalité, ou de religion, ou dans la provocation de lésions corporelles, ou encore dans la création de conditions de vie qui mènent à la destruction desdits groupes (déportation et asservissement, par exemple) Pour punir le crime de génocide, l'Assemblée générale des Nations Unies a adopté, par sa résolution 260 A (III) du 9 décembre 1948, la Convention pour la prévention et la répression du crime de génocide

Le droit à l'alimentation

30. La durée de la vie dépend de manière décisive de l'alimentation et des conditions de logement Le droit à l'alimentation est l'un des droits de l'homme. Les documents internationaux se référant à ce droit présentent quelques différences. Ainsi, l'article 25 de la Déclaration universelle des droits de l'homme prévoit que chaque personne est en droit à un niveau de vie suffisant tandis que l'article 11 du Pacte relatif aux droits économiques, sociaux et culturels va plus loin et prévoit le droit de chaque personne d'améliorer constamment ses conditions de vie. La Déclaration sur le progrès et le développement dans le domaine social prévoit, à l'article 10, point 2, parmi les objectifs pour- [illegible] l'enfant à l'alimentation, au logement et à des soins médicaux adéquats.

31. [illegible] moyens [illegible] mentati[illegible] tion, la conservation et la distribution des aliments [illegible] pays importateurs que des pays exportateurs d'aliments; le principe selon lequel aucun peuple ne peut être privé de ses propres moyens de subsistance. On reconnait que l'élimination de la faim et de la malnutrition est l'un des principaux objectifs du progrès et du développement dans le domaine social.

32. Le niveau de vie des hommes n'est pas le même dans tous les pays. La Déclaration universelle des droits de l'homme stipule, dans son préambule, qu'elle représente un idéal à réaliser pour tous les peuples et toutes les nations, par un ensemble de mesures qui seront adoptées progressivement.

33. Le niveau de vie est le facteur principal qui détermine la durée de la vie des hommes et, en conséquence, le taux de mortalité. Le niveau de vie est fonction du degré de développement politique, économique et social des Etats[33]. De façon concordante, le taux et les tendances de la mortalité sont différents dans le monde[34]. L'on considère même que le niveau de la mortalité, jusqu'à un certain degré, est influencé par des facteurs économiques et sociaux, l'activité des services de santé ne jouant pas grand rôle[35]

34 Le taux de la mortalité dépend aussi de la structure par âge de la population En effet, le niveau de la mortalité, dans certaines conditions sociales et économiques, diminue plus vite dans les pays ayant un niveau élevé de mortalité, au début d'un intervalle [illegible]

35 *La durée moyenne de la vie dépend, en grande* partie, du niveau de la mortalité infantile, qui peut atteindre 25 p 100 du total de la mortalité, dans certaines conditions socio-économiques[37]

36. Indépendamment des facteurs qui peuvent influencer la mortalité, la conclusion fondamentale qui se dégage est que l'espérance de vie à la naissance dépend du degré de développement socio-économique des différents pays, car tous ces facteurs sont finalement conditionnés[38] par le degré de développement socio-économique

37 Ayant en vue des statistiques publiées par l'Organisation des Nations Unies au sujet de 59 pays[39],

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[32] Le Pacte international relatif aux droits économiques, [illegible] point 2, la Déclaration [illegible] le domaine social, [illegible] du développement [illegible] Unies pour le développement, par. 69

[33] En ce qui concerne les rapports entre le développement et la population, ce qui intéresse la politique démographique, les Etats sont d'avis différents (voir "Rapport intérimaire sur la [illegible]

[35] [illegible]

[36] *Ibid.*, p 14

[37] Voir "La mortalité infantile dans les pays du Marché commun", *A B C. de la démographie belge*, Société belge de démographie, p 53

[38] Le rapport entre la mortalité masculine et féminine, la mortalité infantile par groupes d'âge et la mortalité par groupes d'âge peuvent présenter des particularités en certaines situations (voir "Rapport du Comité spécial d'experts chargé *d'étudier les méthodes de révision des tables types de mortalité* des Nations Unies", New York, 17-21 avril 1972 [E/CN 9/273] p 16 à 18)

[39] Voir le tableau 183 de l'*Annuaire statistique 1966* (publication des Nations Unies, n° de vente. 67.XVII 1) en se référant au "produit intérieur brut par habitant" et le *tableau 46 de l'Annuaire démographique, 1969* (publication des Nations Unies, n° de vente · E/F.70.XIII 1) en se référant à "l'espérance de vie à la naissance".

on a conclu que l'espérance de vie à la naissance, pour les personnes de sexe masculin, par rapport au produit intérieur brut par habitant (pour 1969) est la suivante: 65 ans et davantage pour 19 pays ayant un revenu excédant 1000 dollars (70 ans et plus pour 5 pays); 59 ans (à deux exceptions près) pour 29 pays disposant d'un revenu de moins de 400 dollars; l'espérance de vie oscille entre 50 ans et 69 ans pour 14 pays ayant un revenu par habitant allant de 400 à 1000 dollars.

38. L'espérance de vie à la naissance dans le monde entier est de 53 ans[40]. La répartition géographique est la suivante: Afrique, 43 ans; Asie (moins l'URSS), 52 ans; Europe (moins l'URSS), 71 ans; Amérique latine, 60 ans; Amérique du Nord, 70 ans; Océanie, 65 ans; URSS, 70 ans. Evidemment, à l'intérieur des continents il y a des différences importantes découlant du degré de développement économique, social et politique.

39. Etant donné les grandes disparités existant entre les revenus des différentes classes sociales à l'intérieur de certains pays, la durée moyenne de la vie doit être calculée d'une manière différenciée. Les rectifications dépendent aussi d'autres facteurs, comme par exemple: la profession, le lieu de travail, les conditions géographiques internes, le lieu de domicile urbain ou rural, le sexe, le fait que les enfants sont nés de parents mariés ou non mariés.

40. Le développement de la science et du progrès technique ont certains effets sur les droits de l'homme[41], y compris le droit à l'alimentation. Ce dernier droit est aussi influencé par le niveau de l'enseignement qui dépend du développement de l'économie nationale. Ensuite, il y a une relation entre ce développement et celui de la science et du progrès technique. Pour toutes ces raisons, la coopération internationale scientifique et technique contribue, finalement, à la réalisation du droit à l'alimentation.

41. L'espérance de vie à la naissance est plus grande, en général, dans les pays développés du point de vue économique que dans les pays moins développés. Les conditions de vie élevées contribuent à une réduction de la mortalité mais d'une manière différente selon les âges, c'est-à-dire qu'elles favorisent les jeunes et les adultes, moins les vieux et que leur influence est presque insignifiante aux âges très avancés de la population. Le supplément d'espérance de vie à la naissance est plus grand dans les pays ayant une durée de vie plus réduite. Aux âges avancés, le taux de la mortalité a tendance à s'uniformiser avec celui des pays moins développés. Dans certains pays où existent de grands écarts sociaux, l'effet du niveau de vie sur la mortalité est très différent d'une classe sociale à l'autre. Par conséquent, le régime politique peut influencer, dans certaines limites, la durée moyenne de la vie. On suppose que dans des conditions de vie égales, c'est la profession et le lieu de travail qui exercent une influence sur la durée de la vie.

42. Le taux de la mortalité pour la population urbaine est plus bas que celui de la population rurale, y compris les groupes d'âges plus avancés, en raison de différentes conditions de confort. Par conséquent, au fur et à mesure que l'industrialisation et l'urbanisation se développent, la mortalité diminue. La croissance du taux de la fécondité influence le taux de la mortalité par rapport à la mortalité maternelle et à celle des nouveau-nés. Les facteurs géographiques influencent, dans une certaine mesure, le taux de la mortalité. L'espérance de vie des hommes est plus basse que celle des femmes. Le développement économique et social peut changer l'importance et la place des groupes de causes de décès. En effet, ces groupes de causes de décès se manifestant différemment selon les catégories d'âges, l'effet de l'amélioration des conditions de vie sur l'espérance de vie diffère dans chaque catégorie d'âge.

Le droit à la santé

43. L'état de la santé est évalué par le niveau de la mortalité et de la morbidité[42]. Dans la Constitution de l'Organisation mondiale de la santé se trouve la définition suivante "la santé est un état complet de bien-être physique, moral et social et ne consiste pas seulement en une absence de maladie ou d'infirmité"[43].

44. Le droit à la santé est prévu comme l'un des droits de l'homme. Ainsi, l'article 25 de la Déclaration universelle des droits de l'homme montre que chaque personne a le droit à un niveau de vie suffisant pour assurer sa santé, et l'article 12 du Pacte relatif aux droits économiques, sociaux et culturels reconnaît à chaque personne le droit de jouir de la meilleure santé physique et mentale qu'elle puisse réaliser.

45. La relation entre la santé et la mortalité, en ce qui concerne la durée de la vie, est évidente. La population ayant une bonne santé réalise une durée de vie supérieure à celle d'une population ayant une santé précaire. Les facteurs génétiques déterminent aussi la longévité.

46. Finalement, la santé dépend des conditions économiques et sociales et, en même temps, celles-ci l'influencent. Il ressort que les plans de développement national doivent comprendre aussi des programmes sur la santé.

47. Dans les législations nationales il y a des spécifications qui assurent, par des procédés juridiques, la protection de la santé des hommes. La protection la plus efficace est celle du code pénal. Ainsi, les lois nationales

[40] Voir "L'analyse démographique des tendances et niveaux de la mortalité", Séminaire interrégional sur l'analyse de la mortalité, Mamaia, Roumanie, 20 septembre-3 octobre 1972 (ESA/P/AC.2/2), p. 4 et 5.

[41] Voir "Droits de l'homme et progrès de la science et de la technique: *conséquences des progrès scientifiques et techniques sur les droits économiques, sociaux et culturels*" (E/CN.4/1115).

[42] Voir "Rapport du Séminaire interrégional sur l'analyse de la mortalité", Mamaia, Roumanie, 20 septembre-3 octobre 1972 (ST/TAO/Ser.C/145-ST/SAO/Ser.R/15), p. 25.

[43] Voir *Documents officiels de l'Assemblée générale, onzième session, Annexes*, point 31 de l'ordre du jour (A/3525), par. 145.

réglementent les infractions concernant l'endommagement de l'intégrité corporelle et de la santé. L'objet juridique spécifique de ces infractions est représenté par les relations sociales qui consacrent le droit absolu à la sécurité de la personne physique, c'est-à-dire à l'intégrité physique ou psychologique de la personne physique. La réglementation de la protection paternelle et tutélaire peut avoir aussi une grande importance pour assurer la santé de l'enfant, en contrôlant la manière dont celui-ci est élevé et éduqué.

48 L'assistance médicale représente l'un des moyens importants de la protection de la santé. La Déclaration universelle des droits de l'homme, aux termes de son article 25, et le Pacte relatif aux droits économiques, sociaux et culturels, aux termes de son article 12, prévoient le droit aux soins médicaux appropriés, qui doivent se réaliser par les mesures que les Etats adopteront. La Déclaration sur le progrès et le développement dans le domaine social, adoptée par l'Assemblée générale le 11 décembre 1969, va plus loin et stipule, à l'article 10, rubrique *d*, que la protection de la santé de toute la population doit être réalisée, s'il est possible, gratuitement, et l'article 19, rubrique *a*, se réfère aux services médicaux gratuits pour toute la population et aux moyens d'assurer l'assistance préventive et curative accessible à tous. Les paragraphes 68 et 69 de la Stratégie internationale du développement pour la deuxième Décennie des Nations Unies pour le développement de 1970 prévoient la continuation des efforts pour l'éradication, dans le plus grand nombre de pays, des maladies qui affectent encore sérieusement les hommes Pour certaines catégories de personnes, par exemple les femmes enceintes, les enfants, les déficients mentaux, il y a des documents internationaux qui prévoient des mesures spéciales pour la protection de la santé[44]. Par sa résolution 2842 (XXIV) du 18 décembre 1971, l'Assemblée générale a demandé au Secrétaire général de préparer, en collaboration avec les organismes spécialisés, un rapport comprenant des suggestions pour la politique nationale et les actions internationales concernant les nécessités et le rôle des personnes âgées dans la société, dans le contexte du développement.

49 [illegible]
dépende [illegible]
social e [illegible]

cette assistance pour assurer la santé n'est pas le même dans les Etats plus développés du point de vue économique et dans les pays moins développés[45]. En outre, dans ces derniers, les diverses classes sociales ne jouissent pas d'une assistance médicale égale. L'assistance de la population urbaine diffère de celle de la population rurale. Les dépenses pour certains soins médicaux sont tellement élevées qu'ils sont inaccessibles à la plus grande partie de la population.

50. La protection de l'environnement joue un rôle important pour la garantie de la santé. Cette protection peut être réalisée par l'emploi rationnel des ressources naturelles, par la prévention et par la lutte contre la pollution de l'environnement et les effets nocifs des phénomènes naturels Les facteurs suivants doivent faire l'objet, spécialement, d'une protection. l'air, les eaux, le sol et le sous-sol, les forêts et toute autre végétation terrestre et aquatique, la faune terrestre et aquatique, les réserves de la nature Les mesures de protection de l'environnement peuvent être adoptées par des réglementations sur le plan national ainsi que par des actes internationaux.

51 Le niveau de culture générale et d'éducation sanitaire de la population, de plus en plus élevé, joue un rôle important en ce qui concerne la santé La généralisation de l'enseignement obligatoire et la création d'un réseau d'écoles de différentes sortes assurent le niveau de culture générale et le niveau d'éducation sanitaire correspondant. De telles mesures devront être réalisées dans tous les pays Dans le cadre de ces mesures il faudrait déterminer aussi les professions et les occupations dangereuses pour lesquelles les femmes ne devraient pas être engagées et, en même temps, créer les conditions qui permettraient la formation professionnelle des femmes pour des emplois qui leur soient spécifiques

52 [illegible]

professionnelles La protection du travail contribue donc, dans une large mesure, à assurer la santé.

53. Etant donné le rôle joué par la femme dans la production sociale [illegible]

santé de celles-ci, mesures tant à caractère juridique qu'à caractère social-économique.

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[44] La Déclaration des droits de l'enfant, en date du 2 novembre 1959, art 2, 4, 5 et 9, la Déclaration des droits du déficient mental, en date du 20 décembre 1971, art 1, 2, 3 et 7, la Convention n° 100 de l'Organisation internationale du Travail sur l'égalité de rémunération, en date du 6 juin 1951, art 2 et 3, la Déclaration sur l'élimination de la discrimination à l'égard des femmes, en date du 7 novembre 1967, art 10

[45] Dans les pays en voie de développement [illegible]

Part Eight

FAMILY PLANNING

HEALTH AND FAMILY PLANNING *

World Health Organization

FAMILY PLANNING AS A HEALTH PRIORITY

1. The principal theme of this paper is the interrelationship of health and family planning and its implication for health service delivery systems.

2. Family planning can favourably influence the health, development and well-being of the family and, in particular, has an effect on the health measures for health. Thus, family planning care is an integral part of the health care of the family.

3 The health impact of family planning can be considered within the framework of the following influences:

(*a*) Avoidance of unwanted pregnancies and the occurrence of wanted births that might otherwise not have taken place;

(*b*) A change in the total number of children born to a mother;

(*c*) Allowing a natural interval between pregnancies;

(*d*) Changes in the time at which births occur, particularly the first and the last, in relation to the age of the parents, especially the mother.[1]

4. Social, economic and cultural factors impinge on all aspects of human reproduction. For example, high parity (a large number of births) or short pregnancy intervals are commonly associated with low socio-economic status, poor nutrition, poor hygiene, overcrowding, poor education and poor health practices. These interrelated factors in turn tend to be linked with unfavourable outcomes of pregnancy, such as premature or difficult labour, low birth-weight babies, birth trauma and infection, in which it becomes difficult to establish clear causal relations. At the same time, however, there is little doubt that selected interactions of factors, including high numbers and short intervals of pregnancies, increase the risk of unfavourable outcomes It is on the basis of this evidence that the health benefits of family planning are founded. As will be seen, the benefits are most striking in relation to the health of mothers and children.

Maternal health

Mortality

5. While maternal mortality is slightly less with the second and third pregnancies than with the first, it rises with each pregnancy beyond the third and increases significantly with each pregnancy beyond the fifth It is at times possible to dissociate the effects of parity from those of the mother's age, but usually the two factors are interlinked Excess female mortality at childbearing ages over male mortality at equivalent ages further quantifies the loss in such situations. The tragic implications of maternal death in relation to health and welfare of the family certainly require no elaboration

Morbidity

6 The long-term effects of pregnancy and its complications have not been fully assessed, but it is evident that repeated inadequately spaced pregnancies deplete a woman's store of nutrients, including protein, calcium and iron. Iron deficiency anaemia and folic acid deficiency are common in developing countries and not uncommon in some developed countries In South America, iron deficiency anaemia has been found to affect about 5-15 per cent of men and 10-35 per cent of women; in Asia, about 10 per cent of men and 20 per cent of women, rising to 40 per cent in pregnancy; and in the Middle East, approximately 20-25 per cent of pregnant women. In Europe, it is estimated that 10-15 per cent of women suffer from iron deficiency anaemia; and in the United States of America, the corresponding level has been determined, mainly amongst the poorest sections of the population, at about 20 per cent.[2] In studies sponsored by the World Health Organization (WHO) in different parts of the world, the percentage of women with anaemia ranged from 21 per cent to 80 per cent.[3] Pregnancy predisposes women to the manifestations of anaemia because folic acid and iron needs increase sharply during this period, especially where malabsorption or poor diet are involved. In developing countries, therefore, there tends

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* The original text of this paper (E/CONF 60/SYM IV/ [illegible] ation and [illegible] a WHO [illegible] al Report [illegible] *Theme in* [illegible] No. 16 [illegible] 1971).

[2] *Requirements of Ascorbic Acid, Vitamin D, Vitamin B_{12}, Folate, and Iron*, report of a joint FAO/WHO Expert Group, World Health Organization Technical Report Series, No 452 (Geneva, 1970).

[3] *Nutritional Anaemias*, report of a WHO Scientific Group, World Health Organization Technical Report Series, No 405 (Geneva, 1968)

to be a widespread prevalence of maternal malnutrition and anaemia, sometimes labelled "maternal depletion", due to superimposition of an almost continuous sequence of pregnancy and breast-feeding demands on poor maternal diet and heavy physical work. It has been suggested that if the number of pregnancies were limited to three or less, the incidence of severe or moderate anaemia might be reduced by as much as two thirds. The incidence might be further reduced by better pregnancy spacing. [4]

7. Maternal malnutrition and anaemia are aggravated by infection and chronic illness, which further increase the risks associated with repeated pregnancy. In some developing countries, malaria and parasitic infestation contribute to the severity of maternal anaemia connected with malnutrition. Such hazards of infection are greater where there is restricted access to antiseptic conditions, and inadequate drugs and health care facilities.

8. The pregnancy risks associated with obstetrical complications, such as placenta previa, abruptic placenta and rupture of the uterus; a history of medical conditions of the mother, including toxaemia of pregnancy, hereditary disorders, diabetes mellitus and certain psychiatric and neurological conditions, are aggravated by high parity, particularly grand multiparity. [5] Where health and socio-economic conditions are marginal, many of these problems become especially prevalent and more marked as parity and age of the mother increase.

Abortion

9. Intervention to interrupt pregnancy would appear to provide the clearest indication that a pregnancy is unwanted for personal, social or medical reasons. Family planning can help the mother to prevent unwanted pregnancies which might result in unqualified termination of pregnancy with known health hazards for the mother.

10. In an increasing number of countries, pregnancy may be legally interrupted for social or personal reasons, as well as on medical grounds. In many parts of the world, however, women choose hazardous, unqualified and illegal abortions rather than accept the burdens of additional unwanted pregnancies, resulting in serious risk to their life and health. [6] The common practice of abortion is shown in figures from studies in South America, where it was found that one of every four pregnancies among married women and one of every three in broken and common-law homes ended in abortion. [7] In a random sample of 3,776 women (20-45 years of age) living in three cities of Chile, 41 per cent gave a positive history of abortions; and 75.1 per cent of this group admitted to having had up to three induced abortions. [8] For a random sample of 1,662 Peruvian women between 20 and 30 years of age living in the area of the capital (Lima), abortion rates of 20 per 100 pregnancies in the upper socio-economic level, 18 in the middle and 12 in the lower bracket were found. [9] The particular complications of unqualified and illegal abortion include infection, haemorrhage and mechanical injury, and, at times, acute renal failure and thrombo-embolism.

Foetal and neo-natal health

Mortality

11. Peri-natal mortality (a sum total of late foetal and early neo-natal mortality) is closely related to maternal age at pregnancy and parity—two variables which can readily be altered by family planning. A highly significant correlation has been noted between increasing peri-natal death rates and multiparity, although the incidence is also high among primigravida (first pregnancies).

12. Studies show that peri-natal mortality is elevated among young mothers under 17 years of age, is at its lowest level between 20 and 29, and rises sharply thereafter. Among mothers over 40, the rate of peri-natal mortality is several times that among those under 20. The excess rates among young girls are accentuated when associated with higher birth orders. Older mothers of birth order one are at high risk of peri-natal loss; but for all of the younger age categories, there is a direct relationship with parity. Peri-natal mortality rates have been reported to be lowest when the interval from the end of one pregnancy to the beginning of the next is between two and three years. [10]

Foetal malnutrition

13. In recent years, foetal malnutrition has received more attention. It has been discussed as the end-result of two rather different pathological phenomena. In one, maternal vascular disease may restrict blood flow to the placenta, while in the other, maternal malnutrition is believed to reduce the quantity of essential nutrients reaching the foetus. [11] Maternal malnutrition and anaemia have been described above in relation to their serious effects on maternal health; but where nutritional reserves are depleted and food intake during pregnancy

[4] A. K. Rao and C. Gopalan, *Family Size and Nutritional Status*, report of a Workshop on Family Health (Population Council of India, 1971).

[5] A. R. Omran, "Health benefits of family planning", World Health Organization Maternity-Centred Family Planning Programme Paper No. MCH/71.1, pp. 8-9.

[6] E. M. Gold, "Observations on abortion", *World Medical Journal*, vol. 13 (1966), pp. 77-79.

[7] L. Tabah and R. Samuel, "Preliminary findings of a survey on fertility and attitudes toward family formation in Santiago, Chile", in C. V. Kiser, ed., *Research in Family Planning* (Princeton, N.J., Princeton University Press, 1962), pp. 263-304.

[8] R. Armijo and T. Monreal, "The problem of induced abortion in Chile", *Milbank Memorial Fund Quarterly*, vol. XLIII, No. 4, part 2 (October 1965), pp. 263-280, tables 1 and 2.

[9] M.-F. Hall, "Family Planning in Lima, Peru", *Milbank Memorial Fund Quarterly, ibid.*, pp. 100-116, table 1.

[10] World Health Organization, *Health Aspects of Family Planning, loc. cit.*

[11] M. Winick, "Fetal malnutrition", *Clinical Obstetrics and Gynaecology*, vol. 13, pp. 526-541.

is poor, the toll on the developing foetus may also be substantial, adversely affecting birth weight, peri-natal mortality and brain development. Even in developed socio-economic conditions, maternal nutrition is considered to play a role, since pre-pregnancy weight of the mother and weight gain during pregnancy have been shown to be positively associated with birth weight of the infant.[12] In developing countries, the widespread prevalence of chronic malnutrition among women of childbearing age leads to a high incidence of low birth-weight infants A large proportion of peri-natal deaths and peri-natal morbidity occurs among the low birth-weight babies, who thus represent a high risk group in general. Hence, the control of birth weight is considered a prime means of reducing peri-natal mortality and immediate and long-term morbidity.

14 Birth spacing is similarly associated with birth weight and therefore is another important factor in infant survival and health It has been shown that spacing of at least two years between pregnancies has helped to improve birth weights.[13] Short intervals between pregnancies have been shown to be associated with low birth weight, early neurological retardation, as well as lower mean intelligence quotient (IQ) scores at four years of age, even when controlled for socio-economic status and other factors.[14] Foetal malnutrition also has been demonstrated to have a definite retarding effect on brain growth during the critical period before birth.[15] The results of a well-controlled experiment in four Guatemalan villages are of interest, as they show that by supplementary feeding of the pregnant women who are chronically malnourished, the birth weight of their babies is improved [16]

Child health

15. Many studies have documented significant relationships between the health of children, family size and spacing Only some selected representative reports can be cited here.

Post-neo-natal mortality

16 As concerns mortality of infants after the first month of age, 1-12 months, infants of the youngest mothers with the highest parity are at greatest risk, with maternal age being the more important of these two factors Deaths during this period are associated with such environmental factors as housing, sanitation, nutrition and exposure to infectious diseases Many studies support the strong associations between high post-neo-natal mortality, pregnancy at an early age and high parity [17] The timing and spacing and control of the number of births as a means of achieving lower post-neo-natal mortality is highly relevant to family planning practice

Maternal care

17 Care provided by the mother for her infant, and her interests and attitudes towards her children in relation to family size, were analysed as a part of longitudinal studies of pregnancy and childhood in the United Kingdom of Great Britain and Northern Ireland [18] The adverse effects of increasing family size on infant care, use of medical services, interest in school progress and desire for better schooling were consistent.

Infectious disease

18 It has been shown through detailed longitudinal family studies that the prevalence of infectious gastro-enteritis and respiratory disease are directly related to family size [19]

Height and weight

19 Child growth has also been found to be associated with family size Data indicate quite clearly that children in large families are smaller and that first-born children with one or more siblings do not reach the height and weight obtained by those who remain only children [20] A study of pre-school malnutrition at Candelaria, Colombia, showed a significantly higher prevalence of growth retardation among children from families with five or more living children than a

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[12] National Research Council, Committee on Maternal Nutrition and Food and Nutrition Board, *Maternal Nutrition and Course of Pregnancy* (Washington, D C., National Academy of Sciences, 1970)

[13] J. W B Douglas and J M Blomfield, *Children Under Five* (London, George Allen and Unwin, Ltd, 1954); J Yerulshamy and others, "Longitudinal studies of pregnancy on the island of Kauai, Hawaii—I Analysis of previous reproductive history", *American Journal of Obstetrics and Gynecology*, vol. 71 (1956), pp 80-96, J. B Wyon and J E. Gordon, "A long-term prospective type field study of population dynamics in the Punjab, India", in C V. Kiser, ed, *Research in Family Planning* (Princeton, N J, Princeton University Press, 1962), pp 17-32, E H Bishop, "Prematurity, etiology and management", *Postgraduate Medicine*, vol. 35, p 185.

[14] W. L. Holley, A L Rosenbaum and J A Churchill, "Effect of rapid succession of pregnancy" in Pan American Health Organization, *Perinatal Factors Affecting Human Development* (Washington, D C, 1969), World Health Organization Scientific Publication No 185.

[15] M Winick, *loc cit*

[16] J. P Habicht and others, "Relation of maternal supplementary feeding during pregnancy to birth weight and socio-biological factors", paper presented at the Symposium on Intra Uterine Malnutrition, New York, N Y., 1972

[17] S L. Morrison and others, "Social and biological factors in infant mortality—VIII Mortality in the postneonatal period", *Archives of Diseases in Children* vol 34 (1959) pp 389-398, J A Heady and others "Social and biological factors in infant mortality—IV The independent effects of social class, region, the mother's age and her parity", *Lancet* vol 1955 (I), pp 499 503, J B Wyon and J E Gordon, *loc cit.*, E. Siegel and others "Postneonatal mortality in North Carolina", *North Carolina Medical Journal* vol 27 (1966), pp 366-371

[18] J D Nesbit, N J Entwistle, "Intelligence and family size, 1949-1965", *British Journal of Educational Psychology*, vol 37 (1967), pp 188-193

[19] J. H Dingle and others, *Illness in the Home A Study of 25,000 Illnesses in a Group of Cleveland Families* (Cleveland, Press of Western Reserve University, 1964)

[20] M W Grant, "Rate of growth in relation of birth rank and family", *British Journal of Preventive and Social Medicine*, vol 18, No 1 (1964), pp 35-42

matched group of families with four or fewer children.[21]

Intellectual development

20. Few studies dealing with the relationship between family size and intellectual development have used acceptable methods and they are confined to western cultures. However, these show a definite adverse effect of family size on intelligence. One of the most adequately controlled investigations is the long-term follow-up of the large sample of children in the United Kingdom (see para. 17). At 8 years, the children completed four tests—non-verbal intelligence, sentence completion, reading and vocabulary; at 11 years, the reading and vocabulary tests were repeated. For all socio-economic groups, there was a consistent decline in the scores with larger family size.[22] The longitudinal studies indicate that early childhood influences, before age 7, produce the greatest effects.

21. As mentioned earlier, children from large families are more likely to suffer from deficiencies of parental care. Thus, it might be inferred that the quality and quantity of adult contact (that of parents and, in extended families, other adults) may be the most influential factor determining achievement, motivation and perhaps ability. It is clear that the more children a mother has, the less attention she can provide for any one of them. However, other environmental factors, such as crowded living status, reduced income and lower *per capita* spending for food, all associated with large families, also must deter the full intellectual development of such children.

Family health

22. The relationship between family size and selected measures for maternal and child health have been reviewed. In many instances, they reflect the effects of family overcrowding and its correlates. Thus, it might be postulated that the larger the family, the higher the probability of poor adult health—unrelated to their immediate effects of reproduction or growth and development. However, methodologically sound studies to support such a hypothesis are scarce and originate largely from western countries. Therefore, associations of adult health with family size will be alluded to only briefly. For example, the development of rheumatoid arthritis has been shown to be more frequent in persons from larger sibships, and peptic ulcer among fathers increased with the number of children in the family.[23] It has also been suggested that marital adjustment may be associated with family size.

23. Effective family planning can favourably influence the health, development and well-being of family members and the family unit as a whole. It is therefore considered as an important preventive measure in the health care of the family. It may also improve the quality of life through its impact on family health. For example, when children are born at optimum times and are wanted, it is more likely that they will be well cared for and that their environment will be conducive to normal growth and development, while family members can more easily share an emotionally satisfying relationship that will promote family health.[24]

Infertility and sub-fertility

24. Although major emphasis has been placed upon the health benefits of pregnancy, spacing and family size limitation, family planning properly encompasses also a concern with infertility and sub-fertility from the physical and psychological points of view. In some social and cultural milieux, a woman's status and happiness, as well as a man's, are related to his or her fertility or sub-fertility. Hence, ideally, family planning as a component of health services should seek to determine the specific cause of sub-fertility, begin the appropriate treatment and continue care until a child is born to the couple.

CHARACTERISTICS OF MATERNITY WITH RESPECT TO HEALTH ASPECTS OF REPRODUCTION

Maternal health and fertility

25. Maternal health and nutritional status as they relate to fertility have been discussed. Although acute catastrophic starvation, such as was experienced during the Second World War, results in sub-fertility, it is not shown that chronic malnutrition has a major influence. However, among pregnant women and infants, improved nutrition might indirectly affect fertility. For example, reducing infant mortality might lengthen the duration of lactation which would tend to increase the intervals between births and thus reduce fertility. This is, however, a matter of great dispute; and if lactation affects the interpregnancy interval, its effect *per se* is small.[25] On the other hand, socio-economic and cultural changes associated with improved nutrition and falling infant mortality may result in a concomitant decrease in breast-feeding and/or a relaxation in the taboos on coitus during lactation, which would have a reverse effect and tend to raise fertility. Infections, especially venereal diseases and genetic disorders, and age at menarche are among the additional biological factors which affect fertility.

Post-partum amenorrhoea, breast-feeding and weaning practices

26. Post-partum amenorrhoea and breast-feeding and weaning practices, as they relate to fertility, merit

[21] J. D. Wray and A. Aguirre, "Protein-calorie malnutrition in Candelaria, Colombia: I. Prevalence, social and demographic factors", *Journal of Tropical Pediatrics*, vol. 15 (1969), pp. 76-98.

[22] J. D. Nesbit and N. J. Entwistle, *loc. cit.*

[23] E. Chen and S. Cobb, "Family structure in relation to health and disease", *Journal of Chronic Diseases*, vol. 12 (1960), p. 544.

[24] United Nations Children's Fund/World Health Organization Joint Committee, "Review of family planning aspects of family health", Geneva, 1-2 February 1972 (E/ICEF/L.1281).

[25] A. M. Thomson, F. E. Hytten and A. E. Black, *Lactation and Reproduction* (in press).

consideration. Although post-partum amenorrhoea reduces fertility for a total population, there are, unfortunately, limited data concerning post-partum amenorrhoea variations between and within populations. There is evidence that the duration of post-partum amenorrhoea is related to the duration of lactation and to the outcome of previous pregnancy—it being shortest following abortions, slightly longer following stillbirths and neo-natal deaths and longer still if the infant survives the first month.[26]

27 Breast-feeding appears to prolong post-partum amenorrhoea and, consequently, to delay ovulation and pregnancy However, the duration of protection against conception provided by lactation varies considerably between different population groups.[27] It may be that cultural patterns of breast-feeding, the extent and frequency with which an infant is nursed and the previously mentioned prohibitions concerning sexual intercourse during lactation are more important explanations of subsequent pregnancies than is lactation *per se*. There are some data to suggest that children weaned early are those whose growth and health has been failing, whereas those weaned later are those whose growth and health were better.[28]

28. In developing countries, weaning practices play a major role in relation to child survival as well as fertility. Therefore, mothers should be encouraged to breast-feed and additional supplementary foods should be added as the child grows Regrettably, as societies become modernized, preference for artificial feeding has proceeded at an alarming pace. When mothers in impoverished communities with low levels of education choose not to or are unable to breast-feed, their infants may develop fatal gastro-enteritis and nutritional or other diseases that could have been prevented. The death of the infant is often followed closely by another pregnancy Conversely, a new pregnancy may lead to death of the preceding child—the "last but one"—possibly as a result of early weaning [29]

Hormonal contraceptives and breast-feeding

29 Considerable interest and concern has focused on the effects of hormonal contraceptives on lactation Although the question is not fully resolved, there seems to be general agreement that combined oral contraceptives may have an adverse effect on lactation The risk of pregnancy is low during the first four or six weeks post-partum; therefore, hormonal contraceptives could be postponed until lactation is well established Another possibility is to provide other methods of contraception which have no effect on lactation and then to transfer to the estrogen-progestin combined oral pill, if this is considered the method of choice, after cessation of breast-feeding [30]

Socio-cultural determinants and fertility

30 In addition to the biological and related factors associated with fertility, socio-cultural determinants should be noted. For example, the primary obstacles to family planning include. early age at marriage, attitudes related to high levels of mortality, especially childhood mortality; the dependence of women's status in the family and society upon fertility; and the importance given to the birth of sons, or to large families as a means of ensuring support and security in illness or old age Sometimes the methods used in provision of family planning care are not acceptable in a given setting or for individual families Furthermore, major or minor side-effects may discourage acceptance or continuation, especially where there are no easily accessible health services or good quality for care and follow-up Professional and auxiliary health workers' attitudes to family planning are also an important consideration, traditional birth attendants, in particular, might perceive child spacing as reducing the need for their services However, with proper orientation and appropriate support by health team members, they may play a positive role in efforts for provision of improved maternal and child care, including family planning

31 In summary, [illegible]

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THE RATIONALE AND ADVANTAGES OF INTEGRATING FAMILY PLANNING WITH MATERNAL AND CHILD HEALTH AND OTHER FAMILY AND COMMUNITY HEALTH MEASURES

32. The health benefits of family planning cited above illustrate that family planning is a health need for the family. However, many factors will affect decisions to seek and effectively to continue practising family planning. For example, in developing countries where childhood mortality is still high, parents find it difficult to alter their high fertility patterns. Their personal experiences, from an early age onward, have taught them that some of their children will die, regardless of what action they take. Retrospective, cross-sectional and longitudinal studies suggest that increased childhood survival is essential to the widespread acceptance of family planning and recognition of the fact that the practice of family planning and birth spacing will favourably influence child survival [31] The evidence from mathematical models points in the same direc-

[26] *Biological Components of Human Reproduction Studies of their Variations in Population Groups*, report of a WHO Scie[illegible]
Ser [illegible]
[27] [illegible]
[28] [illegible] y
in [illegible]
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[29] [illegible] f
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lation Groups, loc. cit

[30] A M Thomson, F E. Hytten and A E. Black, *op cit*
[31] S Hass[illegible], *Influence of Child Mortality on Population Growth* (Ann Arbor, University of Michigan m[illegible] 1966); E Driver, *Differential Fertility* [illegible]ntral I[illegible] NJ, Princeton University P[illegible]

tion.[32] It also appears that these dynamics have played a role in the demographic revolution.[33]

33. In fact, where infant and childhood mortality are high, isolated family planning programmes are unlikely to convince unresponsive or resistant couples. Many field-workers have found that when family planning programmes are not integrated with or based on family health care provided in health services, it is difficult to sustain their initial impact. Of even greater significance are the more positive reactions of parents to programmes which include family planning among the other family health care measures directed towards reducing child morbidity and mortality than to programmes concerned solely with family planning. Further documentary evidence is needed to support this observation.

34. The nature of modern contraceptive methods is such that supportive health services are required for their proper administration to couples in need. Many aspects of family planning care require the personnel, skills, techniques and facilities of health services. The use of the intra-uterine device (IUD), hormonal contraception and surgical sterilization requires health care for case selection, implementation, follow-up and management of side-effects. The support of the medical community and the health teams is highly desirable and its participation for servicing the programme indispensable. Where family planning programmes are not adequately integrated with health programmes, there is likely to be duplication and fragmentation of resources. At the outset, it is important to secure the most prestigious medical support possible for family planning efforts. The medical profession should be involved in selecting the contraceptive methods to be provided. Unless medical and health workers at all levels, from academic professors to the village midwife, are mobilized and support family planning efforts, community support will be deficient. The provision of measures for family planning as a part of continuing family health care in health services fosters acceptance of contraceptive methods in the face of rumours and concern among the general public. Lastly, the continuing care and follow-up required for medically administered contraceptive methods can be more efficiently provided through integration of family planning and health services resources.

35. There are many logistic reasons for integrating programmes for dealing with the priority needs of mothers and children, including family planning. Funds can be polled, a stronger infrastructure developed, supervision strengthened, duplication of facilities avoided and workers can relate family planning to many of the reasons for the mother's visit for health care (the need for family planning is most evident to parents in connexion with maternity and child care). In most of the world's countries, manpower and other health resources are relatively scarce and careful consideration must be given to their most efficient use. Where funds and personnel are diverted into isolated family planning programmes, there is not only the danger that health services will be weakened, but the likelihood that basic infrastructure, which is important for health objectives of family planning, will be weakened. It would appear that administration of family planning must be carefully balanced with other health services and interdependent programmes developed.

36. It is recognized that at the current time adequate health services are scarce in the rural areas of the developing world. Accordingly, there is concern about the relatively long period of time that will be required to strengthen health services and to bring about significantly reduced infant and childhood mortality and for parents to recognize this reduction. However, many Governments are equally concerned and are planning and implementing programmes that will provide elements of the basic health needs of these areas, including family planning care integrated with maternal and child health activities within health services. The question is how best to balance the former with the latter, considering carefully the special conditions of each country and its varying locales.

Maternity-centred family planning

37. Maternity-centred family planning (integrated MCH/FP care) has as its objective improving the health of mothers, children and the family and emphasizes the provision if integrated adequate maternal and child and family planning care, including pre-natal care. It provides: screening and referral of high risk cases; assistance during childbirth; care of the newborn, the infant and the child; counselling of both parents; nutrition advice and immunization; monitoring of growth and development of children, with family planning and contraception advice as appropriate; proper supervision of the use of the fertility regulation methods and follow-up for possible complications and management. It also includes advice for couples who need care for sub-fertility and infertility. This approach takes into account the fact that whenever there is contact with mothers and children through health services, in hospital, homes and health centres, the opportunity must be taken to improve maternal and child health care, including family planning information, advice and service.

38. Maternity care represents the most obvious element of health services for the introduction of family planning. In any population, a large number of women can be found who have had rapidly repeated pregnancies. Many of them wish to avoid or postpone further childbearing, but do not know how. Under the usual family planning programmes, women are not contacted promptly after a pregnancy so that inquiries repeatedly find them currently pregnant and therefore

[32] D. M. Heer, "Mortality level, desired family size and population increase: further variations on a basic model", *Demography*, vol. 6, No. 2 (1969), pp. 141-149.

[33] A. R. Omran, "The epidemiologic transition: a theory of the epidemiology of population change", *Milbank Memorial Fund Quarterly*, vol. XLIX, part 1 (1971), pp. 509-538.

ineligible for contraceptive advice In fact, it has been determined that without contraception and without lactation, approximately 80 per cent of fertile women will conceive again within a year following delivery.

39 The ante-natal, lying-in, post-partum and inter-conceptional periods seem to offer unique opportunities to advise women about family health in a systematic manner. When the pregnant women in either urban or rural areas can be seen by a nurse, midwife or doctor, education and health care services for mothers and children, including family planning, can be provided. In addition, through the health personnel, the husbands can also be offered family planning education and services

40 The advantages of providing family planning in relation to the maternity cycle and as an aspect of maternal and child health care are·

(*a*) Activities can be focused on those known to be fertile;

(*b*) Delivery or abortion is a time of high motivation for family planning for health reasons and one often providing contacts with the health worker;

(*c*) The trust that develops through contacts with health workers can influence women to accept and practice maternal and child health measures, including family planning;

(*d*) Family planning is a health need for mothers and children and families, and should be a natural part of their health care,

(*e*) Integrated services appear more logical to the families and the need for family planning becomes more obvious to parents in connexion with events in the reproductive cycle such as pregnancy, delivery and child care;

(*f*) The technical and managerial skills and expertise of health workers providing maternal and child care are most closely related to and thus suited for provision of family planning advice and care;

(*g*) The administrative structure and other existing resources can be used, avoiding duplication and competition; thus, cost/effectiveness is greater than with other approaches,

(*h*) Through continuity with maternal and child health/family planning care, follow-up and necessary reinforcing guidance can be provided,

(*i*) Family planning and other maternal and child [illegible]

(*j*) Health measures to reduce child mortality will make couples more receptive to limiting the number of their children.

41. Except in the case of post-partum sterilization, follow-up of the mother should extend beyond the immediate post-partum period The insertion of IUDs can conveniently be done in the post-partum period and oral contraceptives may be prescribed However, follow-up must provide continuing care, reassurance about the frequent minor side effects which occur, and reinsertion of spontaneously expelled IUDs Many women neglect to return for post-partum attention, but do appear at child health clinics seeking care for their infants. By routine inquiries about the mothers' and families' needs and desire for family planning during each contact for infant care, health workers can attend to and follow up a large number of mothers effectively. Furthermore, family planning can be logically presented as a requirement for successful infant care and nutrition

42 [illegible]

and safe abortion care in health services Provision of abortion care would include appropriate physical and psychological support and follow-up of women, as well as advice on contraception to avoid abortions becoming necessary.

Other activities in health services and family planning

43 Although the broadly conceptualized, integrated maternal and child health and family planning activities known as the maternity-centred approach, if fully implemented, can be capable of reaching a high proportion of the population in need of family planning, other health activities and health workers can also make meaningful contributions

44 For example, nutrition rehabilitation centres and day-care centres for pre-school children are highly suitable settings for discussing health aspects of family planning with parents. Where indicated, the provision of supplementary iron, in cases of low maternal haemoglobin levels, either through its addition to contraceptive pills or as a routine preventive measure for all contraceptive patients, is a highly promising approach.

45 Psychosis, cancer, mental retardation and other chronic diseases are known contra-indications to pregnancy. Those providing care in such cases have the opportunity as well as the responsibility to ensure that effective birth control services shall be provided In fact, family planning care could be made available to patients requiring any kind of medical and surgical care

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are closely applicable to the problem of education for fertility management, through improving and supporting direct education measures, guidance of mass media, development of the health aspects of family life education (including sex educational aspects of school health and of out-of-school youth and adult education programmes), strengthening marital counselling and gaining the co-operation of community leaders and groups and other potential collaborators.

Review of the status of development of family planning as a part of health services

Variations in planning and evaluation

47. There is wide variation in patterns of programme planning—from the subjective projection of activities based on past experience to the deliberate, systematic and objective process of collecting data and mobilizing resources. Most programmes combine both these patterns. A general description of what has occurred in the past decade is given below.[34]

48. In countries where health and humanitarian concerns predominate, the stimulus for family planning usually originates in medical circles, often with local, private family planning associations playing an active role in creating a favourable climate of opinion. Where economists are concerned about the effect of population growth on development plans, family planning activity typically originates in the planning board or its equivalent.

49. The official programme is most often the responsibility of the Ministry of Health and at the field level is closely linked to the maternal and child health care given in health centres. A physician with experience in public health is usually appointed to direct the programme and often begins by designating family planning as another health service, to be administered through the existing network of centres or through separate family planning clinics that are especially established.

50. An initial problem in planning a national programme is the need to relate the objectives of family planning to those of national development and to present the health benefits of family planning in an explicit, convincing and consistent way. A common difficulty is that of setting realistic objectives, which take sufficient account of such constraints as limited national resources and the current state of contraceptive technology with due consideration to local availability. This can usually be done by setting objectives on the basis of operational experience, which shows what can realistically be expected of the programme. Another problem is the need to design a programme of adequate managerial format that will facilitate implementation, monitoring and evaluation.

51. Some Governments initiate special evaluation studies to assess the performance of their family planning programmes. Statistical data are usually collected on numbers of acceptors, procedures performed and supplies distributed. Various aspects of the programmes are evaluated; but, as the United Nations Advisory Mission to India pointed out, the assessments tend to be scattered and *ad hoc* in the absence of the over-all plan for evaluation.[35] The Mission suggested that, to be effective, evaluation of programme performance has to be undertaken at all stages; and, ideally, evaluation begins along with the planning of programme operations and should take into account all objectives of the programme.

52. By 1969, it became apparent that the older programmes in Asia were reaching a plateau in their level of achievement. This levelling-off reflects saturation and calls for further programme development. As services became available, the programmes reached those couples ready to adopt family planning who represented a large backlog of potential acceptors. Further programme development in these countries requires new modes of programme delivery, a variety of educational approaches and studies of the optimum combinations of contraceptive methods to be offered in a given socio-cultural setting.

Current status of maternity-centred family planning

53. The effectiveness of including family planning services in large hospital maternity units has been demonstrated. The Population Council began an international post-partum programme in 1966, which has been expanded to over 250 hospitals in a number of countries or areas, including multihospital networks in Colombia, Honduras, Hong Kong, India, Indonesia, Pakistan, Philippines, Puerto Rico, Thailand, Tunisia and the United States of America. The primary purpose of the programme is to reach fertile women immediately following delivery or abortion when they are especially receptive to family planning. In fact, it has been shown that in an urban setting, where most deliveries occur in hospitals, the majority of fertile women will make contact with the programme within a period of above three years.

54. During the first two years of operation of the 25 hospitals then participating in the programme, 236,000 new acceptors were enrolled, representing 11 per cent of the estimated community target population. A little more than half of the acceptors were women who had been delivered in these hospitals and the remainder were "indirect acceptors", women who had been informed by others using the services and who had been attracted from the same community. Information outside the hospital was mainly by world of mouth. It is evident that this is a quite extensive and highly important means for providing information or for communicating the need for family planning programmes in health terms. In the seven hospitals in the United States, 45 per cent of the delivered cases accepted contraception; 21 per cent accepted in the 18 hospitals outside the United States.[36]

55. Based upon the achievements of the post-partum programmes, WHO has developed a substantially broadened approach, i.e., maternity-centred pro-

[34] B. Berelson, "National family planning programmes: where we stand", *Studies in Family Planning*, vol. 39 (supplement) (1969).

[35] "An evaluation of the family planning programmes of the Government of India" (ST/SOA/SER.R/11), para. 268.

[36] G. I. Zatuchni, "Overview of program: two year experience", in G. I. Zatuchni, ed., *Postpartum Family Planning, A Report on the International Program* (New York, McGraw-Hill, 1970), pp. 83-84.

grammes with the linked objectives of improving maternal and child health care and providing family planning as an integral part of this care at all stages of the maternity cycle and during child care (WHO MCH/71.2, 1971). The rationale and advantages of the maternity-centred approach were discussed above in paragraphs 32-46.

... been developed by WHO ...

... following three main areas for action:

(a) An operational programme, designed to improve the obstetrical, gynaecological and paediatric services of major hospitals in urban areas where hospital-based family planning services would also be provided;

(b) Field studies and pilot demonstrations to explore the extension of maternity-centred family planning activities to small units and rural areas;

(c) Activities concerned with relevant education, training and the collection of data on health benefits of family planning.

57. As stated above, the principal experiences with this approach has been with post-partum programmes in large maternity hospital services These programmes have been given priority because large numbers of cases could be conveniently reached administratively and evaluated There has been less experience with the post-partum approach in smaller maternity units, home delivery services and in rural areas Some countries have had experience with developing rural maternal and child health services and home delivery programmes. Family planning activities are already well advanced in some of these, for example, the rule of the rural auxiliary nurse-midwife in India, the MCH regional training centres and health centre programmes in Thailand and the lady family planning visitor and village organizer in Pakistan.

58. To cover the bulk of the population, it is essential to extend this activity to small units in rural areas, as these areas have been less well served with MCH/ ... services and much more remains to be ... il child health and ... or part of govern- ... experience and exper- ... ning. ... locu- ... pro- ... nity-centred programmes as described in paragraph 56,[37] ... WHO ... planning programme.[38] Collaboration with the United Nations Fund for Population Activities (UNFPA), the United Nations Children's Fund (UNICEF), the World Bank, the United States Agency for International Development, the Population Council, the International Planned Parenthood Federation and other United Nations and private agencies has been prominent in the development of these projects.

60. ... the extension of ... activities to smaller ... recently been devel- ...

possible, the number of health centres may be increased to achieve better coverage of the population. Better systems of supervision are being planned to permit optimum use of available medical and auxiliary personnel and related family health education ...

nurses and midwives—receive further training, largely through one or more centres selected by each country or territory to develop national training programmes and conduct pilot demonstrations and research.

61. The integration of family planning with mater- ... developed with WHO assis- ... a number ... lanning is included as one component of a comprehensive project to strengthen basic health services.

PLANNING, ADMINISTRATION AND IMPLEMENTATION OF FAMILY PLANNING IN THE CONTEXT OF HEALTH SERVICES

6 ... for ... the ... would depend. The general administrative setting, division of basic responsibilities, management of per- ... and levels of payments and a series of other factors which have an impact on public administration and service in general.

63. Fundamentally, the introduction of family planning into health services involves tasks that are similar to those faced in introducing and providing any other medical and public health measure There are problems of administration and management of the training of staff, of introducing the subject of fertility regulation into health education activities, of relating the new services to the other ongoing health activities, of team work, of reaching the population coverage, of

[37] *The Work of WHO, 1970 Annual Report of the Director-General to the World Health Assembly and to the United Nations* Official Records of the World Health Organization, No. 188 (Geneva, 1971), chap. 6.

[38] *The Work of WHO, 1972 Annual Report of the Director-* ... *Assembly and to the United Nati*... *World Health Organization,* No ...

developing appropriate health education programmes, of selecting specific technology suited to the community, of supply channels, of transport and of utilization and evaluation. Both from the point of view of the effects on health and from that of organization, services concerned with family planning and those concerned with the general health needs of a community are interdependent.

64. In the past two decades, WHO has assisted Governments in the preparation of plans for the development of public health programmes. In some instances, the approaches to the establishment or expansion of public health services that were embodied in those plans were periodically discarded and new approaches adopted, often without benefit of a thorough evaluation. Governments and WHO could have profited from such evaluations; for example, detailed knowledge might have been acquired of those aspects which were successful and those which failed. However, a basic principle on which there is general agreement has emerged from the experience of WHO in providing assistance to health programmes in developing countries. The fundamental differences in the conditions that influence health care—even in countries that are apparently at a similar level of development—make it indispensable for each country to evolve its own pattern of health services. To assist countries in their efforts to design a national health structure, WHO can give guidance on the basic principles of health care and on the management skills needed to deliver that care. Specific blue prints for the development of public health services, which might be copied by countries, have never been developed, nor would it be desirable tc devise such plans.

65. Briefly, the organizational structure of a system of health care should indicate the levels of responsibility for policy-making, administrative supervision and operational functioning, as well as the channels of communication both vertically—among these three levels—and horizontally—with other sectors of the health services at each level.

66. Within this structure, there are many decisions to be made: for example, the required number of peripheral health centres must be determined; whether peripheral centres should be developed before or after establishments at the intermediate or central level have been strengthened must also be determined. These decisions cannot be generalized; they must be made by individual Governments. Many of the activities in the WHO research programme have been concerned with finding a mechanism that would enable Governments to make such decisions objectively and to sharpen a country's ability to develop its own pattern of health services. One current effort in WHO that appears to be producing results adopts the following project systems analysis approach.[39]

[39] World Health Organization, "Health project formulation, a manual of concepts and procedures" (document PSA/71.1/Rev.1).

67. Before any programme is expanded, there must be an objective determination of what is functional and a decision taken on specific programme goals. Then, during a one- to two-year period of trial and error, programme achievements that have been attained through the tactics employed can be compared with the goals. This approach differs fundamentally from the familiar demonstration or pilot project approach. It rests upon the use of a new mechanism that is derived from the modern managerial techniques employed in industry, and through which Governments identify the development objectives of proposed projects and to plan the activities required to achieve those objectives.

68. One salient feature of the project systems analysis method is that evaluation is built into the planning process. The monitoring of progress is held to be an integral part of project formulation so that plans are constantly tested and assessed. Modification of the plan continues until the service is operating at the level required to attain the project objectives. The evaluation techniques can also be used to follow up completed projects, so that no activities are expanded or new projects created without an assessment of the results of completed projects. The basic objective of technical assistance is the achievement of long-term and self-sustained development and no project can be considered to have reached this objective until follow-up measures have demonstrated it. The evaluation of project activities in a specific field can be extremely complex because many factors influence the final result. The problems inherent in the creation of isolated projects have brought about an appreciation of the need to co-ordinate and integrate projects into a comprehensive programme with broad objectives and prospects of effective impact.

69. Another characteristic of project systems analysis is its orientation. It is truly suited to project-oriented national programmes. As such, it cannot form the basis of agency-oriented programme formulation, but it can be applied to family planning activities in countries aided by international agencies.

Problems of organization, administration and service

70. Countries with higher levels of health resources have been able to train health manpower relatively quickly to carry out family planning tasks. They have been able to utilize the multiple points of contact with the target populations offered by health services and to provide the continuity of care and supervision that improve family planning efforts. Better health resources are usually associated with improvements in the other socio-economic factors that enhance successful family planning practice, not the least significant of these being an effective administrative structure in the country in general, and in the health services specifically, through which the planning, implementation and evaluation of the programme can be conducted, controlled and supervised.

71. Health services are organized at central, intermediate and peripheral levels, and the recognized levels of administrative action are for policy-making, for administrative and executive supervision and for functional service.

72. In considering the problems of over-all administration for the implementation of a family planning programme, action has to be adapted to the three levels of organizational structure of health services

Central level

73. The central administrative unit serves at the national level for planning, administration and policy formulation

74. This central unit may or may not be the central co-ordinating body for the national family planning programme, but will be concerned only with administering the programme within the public health sector and ensuring close co-operation and co-ordination with activities under the administrative control of other sectors or agencies.

75 In some countries without regional autonomy, this body will have national authority and administrative control. In other countries where regionalization is well developed, the main administration, control and supervision of the programme will be at the regional headquarters The reference made to the central level of administration will apply equally to such administrations.

76. It is important that the personnel involved with policy-making at the central level should be familiar with and active in field activities and peripheral unit problems.

77. [illegible] body [illegible] activit[illegible] progra[illegible] be required are. the fiscal arrangements for the programme; the operational standards, including the training of personnel and operational units; evaluation criteria and system of data collection and analysis; the development of training at professional and auxiliary levels; enabling legislation; research policy; the establishment of field experiments, pilot projects and demonstration units

78 The administrative and executive action to be undertaken by the central unit will be concerned mainly with two areas which are interdependent: first, the general planning for the establishment of a network of services for family planning within the public health sector, including the provision of the resources and transport required for the programme; secondly, the maintenance of co-ordination with other government ministries or departments, other sectors and agencies such as leading professional bodies and community groups to encourage the integration of effort in the programme and for co-operation in the fields of evaluation and research

79 The major responsibilities of the central unit with regard to the functional operation of the programme will be in maintaining close personal contact with field activities to encourage and support uninterrupted implementation of the programme, including the continuous flow of supplies and to provide necessary technical guidance and supervision.

80. These activities may involve the drafting of necessary legislation, the design of standard record systems and the preparation of various health education materials including mass media and desirable operational manuals for the guidance of field workers

Intermediate level

81 The intermediate organization is chiefly responsible for the general administration of the work of several peripheral units and for providing consultant supervision and referral services to such units.

82. Policy decisions may be required particularly on the phasing of the programme in relation to local strategies, while administrative and executive action, as at the central level, will relate to the supervision of the logistics of the programme and the maintenance of co-ordination and co-operation with other agencies. The particular areas of concern will be training programmes, the provision of supplies and evaluation techniques

Peripheral level

83. The special problems of coverage of rural areas were mentioned above in paragraphs 36 and 57-60 The obstacles are compounded by severe shortages of trained health personnel, limited facilities and geographically uneven dispersion of villages. Access to basic health services is also affected by poor roads and lack of transport for patients and staff

84. Resolution WHA 21 43 of the Twenty-first World Health Assembly [40] requests that family planning be integrated within basic health services. This conclusion was not based on assumption about the value of integration, rather, it derived from considerable experience with single-purpose mass campaigns and was particularly pertinent to the nature of family planning as a personal, preventive practice. [41] An attack against an infectious disease may involve changing one or more components of man's environment, or may require only a single injection. Family planning involves the entire socio-cultural and psychological complex of the conjugal relationship itself, with couples being required to take repeated action of a highly personal nature

85. Where coverage in rural areas is sought, emphasis must be placed on developing the health infrastructure at least to the minimum for implementation of

[40] World Health Organization, *Handbook of Resolutions and Decisions of the World Health Assembly and the Executive Board Volume I, 1948 1972,* sect 1.6.3, resolution WHA 21 43

[41] *Proceedings of the World Health Assembly Twenty-first Assembly*, Official Records of the World Health Organization No 168 (Geneva, 1968), pp 52 53

basic health services, including maternal and child health and family planning. In realistic efforts to expand programmes to the periphery, financial costs and organizational difficulties increase, particularly where recruitment, selection, training and supervision of professional and indigenous staff are concerned. There also will be the need to improve physical facilities, purchase equipment and supplies, provide and maintain transport for personnel, improve reporting and evaluation and adapt the programme to community needs.

86. The main objective of the maternity-centred approach outlined earlier is to extend priority integrated maternal and child health/family planning, as part of the health services, to dispersed rural populations, which in developing countries often comprise more than four fifths of the total population. Two particular problems related to adapting the maternity-centred approach in rural areas are the small number of women delivered by trained personnel and the need to involve the community, including traditional birth attendants, in the programme. As to the first problem, the introduction of improved and expanded maternity care and counselling on all aspects of family health through home visiting can help, as can the integration of family planning in child care services. As to the second problem, some steps are being taken to encourage active community participation in the family health/family planning programme.[42] Education of the parents on aspects of child health and the importance of regular return visits for child health care should begin in the ante-partum period. During bedside or home visits in the puerperium, the necessity of regular clinic attendance for the child should be given emphasis equal to that on family planning. Lastly, when an IUD is inserted post-partum, or a prescription for a contraceptive given, the importance of child visits and the reasons for these should be reiterated.

87. It has been suggested that discussions with opinion leaders, such as village headmen, members of town committees, religious leaders, youth leaders and teachers, would help legitimize family planning and create a climate that should lead to some regular means of communication and community support for the programmes. Indigenous village field-workers may be useful in identifying pregnant and post-partum women and expediting the referral of the women and their young children for maternal and child health care, including family planning. As a part of their activities, field-workers also can assist opinion leaders in the generation of consumer involvement in the programme. The traditional birth attendant, who in many developing countries attends the great majority of rural deliveries, should be most closely involved in the maternity-centred family planning programme. Success in attaining her co-operation is crucial to the programme.

[42] World Health Organization, "Plan of organization for a family planning project in Western Samoa" (document WHO/WES-0509).

The satisfied user may also prove of great help in gaining active community support. In fact, the advice and counsel of satisfied acceptors and opinion leaders as ways of gaining and maintaining community support may prove mutually helpful.

Hospitalization of women for delivery

88. The development of small regional or maternity hospitals for delivery may be of value in rural areas; but problems of transportation, heavy capital investment and acceptance by rural women of institutional deliveries make early widespread deployment of such facilities impractical except in relatively densely settled areas. Indeed, it has been observed that beds in some maternity units and health care centres in rural areas are under-utilized.

Home deliveries by trained midwives or auxiliary midwives with pre-natal and post-natal attendance of mothers at the health centre for maternal and child health/family planning care

89. Such a system may provide excellent care, but would require such a large number of trained midwives that it is unrealistic as a model for general implementation in the great majority of developing countries, unless the traditional birth attendant is also utilised. On the other hand, a few countries have extended their health infrastructure and trained a relatively large number of auxiliary midwives. Even in such favoured situations, transport of and attendance by the villagers remain major problems. In Thailand, a project to provide 3,600 motor-cycles to trained midwives and nurse-midwives has begun. Maintenance of the equipment, a systematic plan for assuring contact between the midwife and the population under her care and acceptance of the trained midwife by the local population are substantial challenges to this promising and ambitious project.[43]

Home deliveries by traditional birth attendants with some professional supervision

90. As indicated, in most rural areas, shortages of trained personnel, lack of transport and long-standing patterns of birth attendance make utilization of traditional midwives highly desirable, provided they receive essential training and support. In fact, in many rural situations, the involvement of the traditional birth attendant is necessary and unavoidable.

91. Training courses for traditional birth attendants have been given for many years under projects assisted by WHO and UNICEF. The usefulness of these efforts has depended upon many factors, including the attitudes of health workers in accepting them, careful design and adjustment to the experience of the trainees and the maintenance of close contact with them after training. More recently, efforts have been made to

[43] H. C. Taylor and A. L. Banks, "Family planning programmes in Thailand", report to the World Health Organization, 1971.

involve the traditional birth attendants in family planning activities. Success has been limited; but, none the less, the implementation of organized systems with adequate administrative and logistic support appear justified If traditional birth attendants are to be used extensively, they must be brought under skilled supervision and their role accepted by all the members of the health team. The problems of legal status, registration and training require solution The trained midwife needs to establish a rapport with and give close support to the traditional birth attendants so that supervision can be carried out openly and constructively. In order to provide adequate services, screening and referral systems have to be developed for high-risk cases.

Education of families and the community

92. Although most of the family planning pro- [illegible]

First and foremost are the husbands, who are often overlooked in educational programmes Special attention may need to be given to arranging educational activities either on a person-to-person basis or in groups to engage men in discussion with health personnel on family planning issues It is important that the climate be such as to enable them to ventilate their views which should serve as a spring-board for providing the needed information for correcting wrong notions Labour unions and industries would be potent channels for reaching men. In cultures where the extended family still exists, the educational programme should attempt to reach the family constellation, particularly the heads of the clans. Reference groups, such as influential friends, respected leaders in the community, religious and youth leaders and professional groups, mass media people, administrative and legislative groups and community service workers, need to be considered and involved in planning a systematic health education programme of the community.

93 General information programmes using mass media—radio, newspapers, posters, pamphlets, cinema, television and the like—should create awareness and justify the programme These efforts should be reinforced by personal contacts, either individual or in groups Organizing study groups, seminars or parents' classes, or integrating family planning in already organized discussion groups, would help the educational efforts Sustained exchanges of information and involvement of the target groups are important to keep the programme uppermost in their minds as well as to instil in them the feeling that people care about them as individuals and are concerned about their total well-being

94 There is no single best method that can be recommended Various previously employed techniques should be considered and new ones tested It must be remembered, however, that the underlying philosophy of integration requires that educational efforts must be directed equally, if not primarily, to the utilization of maternal and child health services.

Collaboration and co-operation between integrated health programmes and other community programmes or family planning activities outside the health sector

95. It is essential for those responsible for the planning and implementation of health services at the central, intermediate or local level to lay down procedures for ensuring effective collaboration and co-operation with other official and non-official agencies involved in various aspects of the family planning programme Public education, for example, may be enhanced through agencies responsible for communications, information and publications Personal support may be achieved by co-ordination with community development workers, agricultural extension agents, religious and youth leaders and with teachers. Social welfare agencies, because families receive grants on the basis of family size, child protection services and services for unmarried mothers, obviously should be involved and health personnel should be aware of their activities The manufacture and importation of contraceptive supplies may require co-ordination with commerce and customs The need to obtain support from census and social research departments as well as professional education institutions has been apparent for many years Experience in some countries has demonstrated that the labour ministry and the military can be involved to advantage Obviously, it is essential to communicate effectively the objects and needs of the family planning programme to finance services Legislation related to family planning activities should define responsibilities of health care workers in realistic terms, taking into account the circumstances prevailing within the country

EDUCATION AND TRAINING OF HEALTH AND OTHER WORKERS FOR THEIR ROLES IN HEALTH ASPECTS OF FAMILY PLANNING

96. A serious obstacle that has to be overcome in [illegible]

in developing countries [44] Health manpower planning is needed to help Governments estimate the quantity and type of knowledge, skills and abilities required to implement their health programmes

97. Every country undertaking the introduction or expansion of family planning activities faces the problem of determining the type, qualification, number, recruitment and training of health and other workers required for the programme. Because of the acute shortage of qualified personnel, large-scale training

[44] World Health Organization, "Proceedings of the World Health Assembly, Twenty-Fourth Assembly", *Official Records of the World Health Organization*, No 194, pp 559-579.

programmes are often initiated before answers to these basic questions have been found.

98. Some instruction in family planning should be given to all health personnel, indicating the need for the inclusion of family planning in the regular curricula of schools of medicine, nursing and midwifery and other health sciences. As a long-term objective, all personnel should understand that family planning is a part of general health care and therefore part of their responsibilities.[45] In addition, the introduction of family planning in health services necessitates a clear definition of the duties of all categories and levels of health personnel, the orientation of staff already in service or available for employment and the inclusion of family planning in the basic education of all relevant personnel to ensure that they will have sufficient knowledge and skill to be employed by the health services.

99. An integrated approach to the teaching of family planning involves the subjects of physiology, obstetrics and gynaecology, paediatrics and social and preventive medicine. Until recently, comparatively little use was made in medical teaching of the rapidly increasing range of audio-visual media which can help teachers to improve the speed and effectiveness of student learning. Complicated equipment is not necessary to achieve innovation in teaching methods and even simple audio-visual aids may help offset teaching staff shortages in developing countries.[46]

100. The teaching of management skills has been almost totally neglected in education and training programmes for health personnel. One of the fundamental tasks of management, whether in the national health service or in a peripheral health post, is to adapt rationally to changes as they occur. The purpose is to minimize the disrupting effect of unforeseen developments and to maximize opportunities for the achievement of shifting objectives.[47] Management skills are especially pertinent to the introduction and integration of family planning into the health services and should be included in the training given to all health personnel. The development of managerial and administrative skills and specializations is equally important for administration and training. This aspect, however, has not received sufficient attention in most countries, and this deficiency is one of the most important deterrents to the development of effective family planning programmes. Trained personnel are required for manpower planning functions, for the design of manpower training and development strategies, and for the administration, operation and evaluation of service programmes.

101. There is also the need to orient teaching to the work to be performed and to recommend the development of field-training areas that focus on the provision of comprehensive health care for the family and community. The strengthening of teaching activities should not concentrate on family planning in a narrow sense, but should be broadened in order to train staff better to provide comprehensive care.

102. All personnel engaged in health programmes involving family planning need preparation in health education. Well-qualified health education staff are required to help make a systematic and detailed study of the educational needs of different groups of people in the community, in particular, adolescents and future parents, as well as to identify, strengthen and give support to the educational functions and tasks of staff at each level of the family planning programme.

103. The general education and training requirements outlined above must be supplemented by consideration of specific categories of personnel and their particular needs.

Medical education

104. The inclusion of human reproduction, family planning and population dynamics in curricula is of relatively recent origin and is still in the initial stages of development in many countries having family planning programmes. Some studies undertaken on medical students' knowledge of, and attitude towards, family planning indicate little awareness of its objectives and the role they themselves might have to play in this regard, in their future careers. However, increasing awareness of the need for such education in recent years is producing efforts to include this area in medical school curricula.

105. The formulation of appropriate courses of study in medical schools, the integration of new subject-matter in existing curricula, the development of resources and new methods of teaching should give priority to the advanced training of the teaching staff of relevant disciplines, in particular preventive and social medicine, in gynaecology and obstetrics and in paediatrics; to the introduction of interdisciplinary teaching; to the improvement and expansion of medical faculties and teaching institutions; and to the development of rural and urban field practice areas in which students can acquire knowledge and skill in the delivery of maternal and child health care, including family planning.

106. Paediatricians, obstetricians and general practitioners already employed in the health services or in private practice should receive orientation or refresher courses. Various medical associations in collaboration with Governments could organize the training. The content of such training would be: a general review of various aspects of human reproduction and population dynamics; government policy concerning the inclusion of family planning activities in its regular health programme; the health benefits and promotional

[45] World Health Organization, *Family Planning in Health Services*, report of a WHO Expert Committee, Technical Report Series No. 476 (1971).

[46] M. A. C. Dowling, "Audio-visual media in medical training", *World Health Organization Chronicle*, vol. 26, No. 1 (1971), pp. 3-6.

[47] N. MacKenzie, M. Eraut and H. C. Jones, *Teaching and Learning: An Introduction to New Methods and Resources in Higher Education* (United Nations Educational, Scientific and Cultural Organization/International Association of Universities (co-editors) publication, Sales No. ED.70/XVII.9/A), chap. XIV.

aspects of family planning; the integration of family planning into the daily work of educating patients and their families; and clinical training in newly developed contraceptive techniques

Nursing and midwifery

107 As in medical education, the subjects of human reproduction, family planning and population dynamics can and should be incorporated in curricula of schools of nursing and midwifery. Staff who will be expected to include family planning in their daily work in health centres, clinics and hospitals must be well informed, understand the tasks they are to undertake, especially the supervision and training of auxiliary staff and receive some orientation on the role played by each member of an interdisciplinary health team. In addition to competence in their own professional field, they must have a thorough knowledge of human reproduction, family planning and population dynamics, of the principles and methods of health education, and of the variables of demographic and health statistics as they relate to biological, social and cultural factors that condition the health of the individual, the family and the community as a whole.[48] In traditional communities, where only female health personnel are acceptable in MCH and family planning care and where women physicians are in short supply, certain technical procedures, such as the insertion of intra-uterine devices, may be delegated to the nurse-midwife. For this purpose, special training courses and supervision have to be organized.

Training of administrators, managers and manpower specialists

108. The special skills required to plan, execute, administer and evaluate family planning programmes [illegible]

with emphasis on personnel supervision and supervisory staff and networks, modern managerial techniques, programme evaluation and operations research; and the basics of manpower planning, and utilization, training and development. Training for manpower development specialists should include manpower planning and the design of manpower training and development strategies, task performance and analysis, personnel management and supervision, training needs and assessment and training evaluation and design of training curricula and materials

Training in health education

109 Staff at all levels need to know and be able to use the skills of health education in giving family planning information and education, so that they can encourage people to make their own decisions and take action for the improvement of their family's health Unfortunately, few countries have enough professionally qualified health educators to form a health education unit capable of guiding and assisting in the planning, implementation and evaluation of family planning educational activities There is also an acute shortage of teachers of health education, not only for the preparation of health educators and other health workers, but for the training of teachers in primary and secondary schools, teacher-training institutions and functional literacy classes.

110 [illegible] others, [illegible] priority f [illegible] aspects of family planning and related matters of importance to the health care and well-being of individuals, families and community groups

Health auxiliaries

111. The need to improve the training of auxiliaries, especially auxiliary nurses and midwives, to render services to families, particularly to mothers and children, has been discussed The training of sufficient numbers of auxiliaries to render service in maternal and child care and family planning in the rural areas is given high priority.

112 Auxiliary staff in the outposts of the health services play a key role in the total health service system They are usually the first to be called upon in times of need Their integrity, attitudes, knowledge and skills may determine whether the people will accept or reject modern medicine when it is extended to the villages It is of utmost importance that they obtain all the support they require from professional staff

113. If the activities of auxiliaries are to be effective, the following must be assured clearly defined responsibilities; supervision that includes continuing in-service training, guidance and encouragement, the support of a multidisciplinary team; an effective system of referral to appropriate services; maximum community participation in the health programme, and the regular provision of adequate supplies.

114 Continuing in-service training should include further preparation in family health care, including family planning; the principles and methods of individual counselling; methods of working with groups to help create an atmosphere conducive to the acceptance of new ideas such as family planning; and ways of involving the whole community in the planning and delivery of an improved health service

Workers in other sectors

115. Personnel in such fields as social work, home economics, teaching, community development and agriculture have an important role to play in increasing community and individual awareness and improving the availability of health services, including family planning Before such personnel can play an effective role, they must be aware of the relevance of the benefits of family planning to the goals of their own disciplines,

[48] World Health Organization, "Nursing and midwifery in family planning" (document WHO/NURS/69 79)

Only then can family planning be effectively integrated into work at the field level.

116. Encouragement should be given for the integration of the health aspects of family planning into the basic curricula of schools of public administration, social work and home economics, teacher-training colleges, community development and agricultural institutes and similar institutions that prepare personnel who may come into contact with health programmes or be involved in aspects of family planning.

117. Orientation courses for these groups should consist of information on factors influencing maternal and child health and family health, including the health benefits of family planning for families, government policy on family planning, organization and delivery of family planning through community health services, methods of contraception, the attitude of the community towards child-bearing, child-rearing and family planning and the counselling of individuals and groups in matters related to family health and family planning. These workers can contribute to the acceptance in their own fields of family planning as a means of improving family and community health.

Evaluation of family planning programmes in health services

118. Specific aspects of family planning evaluation and operational research programmes are covered in another paper prepared by WHO for the World Population Conference.[49] Some general concepts in relation to the evaluation of family planning programmes are described below.

119. It is now generally accepted that evaluation should be built into the process of planning, and continuous evaluation is essential to systematic measurement of success, or failure, of the programme in meeting its over-all objectives. In most family planning programmes, evaluation is receiving more emphasis, but relatively few countries have implemented systems to produce the information required as a basis for continuous decision-making. Nevertheless, family planning programmes appear to have become more concerned with evaluation than have many other health activities. Ideally, the effectiveness of family planning programmes integrated with health services should be measured by their achievement of the health benefits and fertility regulation discussed earlier in the paper. However, such changes are influenced by many social and environmental factors that lie outside the realm of health services. Moreover, such changes only come about slowly.

120. Despite these difficulties, much can be accomplished by the commitment of adequate resources and competent professional personnel to planning and evaluation at the central level, with appropriate training for staff at the intermediate and local levels. Six general requirements, applicable to family planning and maternal and child health services evaluation, have been identified: (1) defining programme objectives; (2) determining the component activities (inputs) and the results (outputs); (3) deciding on simple and feasible measurements and standards; (4) identifying basic situations for control or comparison; (5) establishing the measurement process (methods of measurement and data collection); (6) collating, analysing and interpreting the information and relating it to objectives.[50]

121. Most family planning programmes have emphasized the setting of objectives, human and material inputs (such as personnel for clinical services), information and education activities, facilities, equipment, supplies and funds. Attempts can be made to assess the effects that different types and quantities of inputs have on achievement of output objectives; for example, to determine which aspects of clinic staffing, location, hours of operation, number of patients etc., produce given outputs.

122. Attempts may be made to answer questions of the relation of inputs to outputs through comparative studies. For example, the relation may differ so clearly, according to the characteristics of the area, the personnel or the administration, that important conclusions can be drawn immediately. Assessments can also be made of people providing the services. Changes in their number, distribution, characteristics and ability are of great importance to the programme, while the attitudes of health personnel and their knowledge of family planning practices have direct programme implications. In most health programmes, quality of planning practices have direct programme implications. In most health programmes, quality of care is assessed not only from observations of technical expertise, but according to considerations of time, efforts made to explain to patients and sensitivity shown towards them. Usually, it will be necessary to establish a basis for changes to be measured over a period of time as programme inputs begin to operate. Another relatively simple, frequently applied system of measurement involves the use of service statistics. Programme success is measured in terms of family planning acceptors, including those sterilized and current users of contraceptives, according to method. These data are recorded and reported from the peripheral level for analysis, interpretation and feedback by the central or district levels. Reporting of acceptors—new and old—is in itself of limited value. The determination of rates of continuing use may require special sample surveys, but it provides much more meaningful intermediate indicators of programme effectiveness. It is also important to report acceptors and continuing users in relation to patient characteristics, such as age, number of living children, interval since last birth, previous contraceptive use and other such information. Analysis of these data is important

[49] See "Research on the biomedical aspects of fertility regulation and on the operational aspects of family planning programmes", *Population Debate,* vol. II, part eight.

[50] World Health Organization, *Family Planning in Health Services, loc. cit.*

to programme evaluation because the results indicate who is being covered and—more important—when compared with the target population, who is not covered More effective programming often can be achieved by analysis and study of these data in relation to programme objectives.

123. Family planning and health services may also be evaluated through determination of changes in the awareness, knowledge, attitudes and practices of persons exposed to the programme.

124. The most difficult phase of the evaluation is the determination of the effects of family planning and health services on the over-all health and fertility status of a population Health benefits are the most difficult to determine since they are influenced by so many circumstances Measurements of changes in fertility following the introduction of family planning may be obtained from registration of births, where these are completely reported The practice of registration of births is a critical consideration when planning the evaluation of family planning and maternal and child health services. Changes in fertility among those at high risk of maternal, infant and child mortality and morbidity, as outlined in the first section of this paper, could also be assessed, to some degree, from birth and death records Changes in the incidence of hazardous and unqualified abortions are of special interest.

125. Trends in maternal, peri-natal and infant mortality and morbidity rates, by cause, and possibly the previously noted adverse health effects of poor pregnancy spacing and large family size may also be measured

126. Changes in any of the above-mentioned rates after implementation of family planning and health services may reflect the effectiveness of the programme However, where population groups or social and environmental conditions are also undergoing change, comparison groups and refined controls are necessary to provide results which will satisfy rigorous scientific requirements

127. The stages of evaluation described above refer to the effectiveness or benefits of a family planning programme. Measurement of cost efficiency is an important component of evaluation. The determination of the costs of a programme requires various accounting procedures to relate the costs of resources to those of operation. The relating of costs to services utilized, effects on reproductive performance, or health status [illegible]

with varying degrees of success, to have a component of systematic evaluation built into their ongoing programmes.

Summary and conclusions

128 This paper has focused principally on the health benefits of family planning, and their realization through provision of health services including family planning

129. Evidence is presented which supports the conviction that increasing family size, particularly with closely spaced pregnancies, is associated with higher maternal, foetal, neo-natal and post-neo-natal mortality and morbidity; higher low birth-weight rates and their sequelae; increasing incidence of infectious diseases in parents and children, poorer growth—both height and weight—among pre-school and school children; relatively poor intellectual development among children; and increased prevalence of certain diseases among parents. Under current conditions, children and parents in well-spaced smaller families appear to enjoy better health status Although emphasis has been placed upon the health benefits of spaced pregnancies and limiting family size, family planning in health services also properly encompasses a concern for infertility and sub-fertility.

130 This résumé of the knowledge to date should be considered in the light of the following implications for policy development and in relation to the requirements of health services and family planning and of programme planning

131 The achievement of well-spaced smaller families for all socio-economic groups should result, first of all, in better survival rates and health for mothers and children, and for families in general, throughout the world Mothers in good health whose nutritional status is adequate and has not been depleted through frequent childbearing are less likely to deliver infants at risk as the result of low birth weight Where maternal malnutrition and anaemia are prevalent, health and socio-economic conditions marginal and health services not well developed, the adverse effects of frequent pregnancies are much greater and more common.

132 Other potential health benefits of a regulated family size and child spacing operate in a less direct fashion, but may also be reflected in lower death rates and less disease and disability Overcrowding and its concomitants will be much less serious and parents will have more food, resources, energy and time to offer to each child. This will result in less malnutrition and impaired growth and development of their children, with greater resistance to childhood infectious diseases, especially where maternal and child health services, including family planning, can be made available Children may be better cared for, with less exposure to accident situations

133. Parents should be less susceptible to certain chronic diseases and smaller family size may promote their better mental health and marital adjustment. They will be more likely to continue their own development as individuals, particularly mothers, who being less depleted and less exhausted will be less likely to neglect their children and themselves They should be able to breast-feed for a longer period, and interest in infant health care and family planning should increase. The economic benefits of fertility regulation will ultimately

make higher educational aspirations for children more achievable. No less important to attaining these aspirations will be the improved intellectual development resulting from greater stimulation in early childhood as a consequence of the better physical and mental health of the parents.

134. The rationale and advantages of integrating family planning with maternal and child care and other family and community health measures have been outlined in some detail in this paper. A broad maternity-centred approach to family planning which concentrates on the provision of maternal and child health care, including family planning, is gaining wide acceptance in urban hospital settings and gradually is being adapted to rural areas.

135. Since the establishment of the first national family planning programmes in the early 1950s, there has been a considerable increase in the number of countries adopting policies favouring or supporting family planning activities. It is estimated that more than four fifths of the population in developing areas live in countries that favour family planning. In developing countries, the growth of family planning programmes in the context of health services is especially related to coverage for rural areas. Organization and administration, of course, vary from country to country. Whatever type of system of programme delivery is selected, there are a number of common conditions that influence its effectiveness, including the degree of confidence people have in the health services, the availability of resources and quality of care provided and the commitment of health service personnel to their work. Mass communications have proved useful in some countries, but their ultimate effectiveness is greatly dependent upon meaningful personal contacts.

136. To bring about the benefits of family planning in a given society, health workers and health services should help couples on the basis of the individual benefits for the family, individual goals, individual plans, their particular felt needs and the cultural values of their society. Sensitivity to needs will remain a prime consideration for health services providing maternal and child health and family planning care. For harassed parents, burdened with the many health problems commonly found in developing countries, the offered advice and care may be impossible to take up and therefore may be more guilt-producing than they are helpful. With better spaced, smaller families, recommended nutritional, immunization, environmental and other health practices may achieve new relevance and be more effective. Post-partum amenorrhoea, breast-feeding and weaning practices are factors of major importance in fertility regulation and infant and childhood survival. Traditions affecting the age at marriage, the value attached to large families and the birth of sons, and attitudes of particular persons in village communities, including traditional birth attendants and community opinion leaders, must be carefully considered in programme planning and implementation.

137. The world shortage of health manpower represents a serious obstacle to the provision of health services, including family planning. Health manpower development often proceeds without the attention to type, qualification, number and availability of personnel that is a prerequisite of rational programme planning and implementation. Special attention is given in this paper to education and training of physicians, nurses, educators and administrators, health educators and health auxiliaries, including trained midwives, in all aspects of family health including maternal and child health and family planning, as well as to the introduction of training to give administrative and managerial expertise. Training of traditional birth attendants and other indigenous practitioners who can support measures for family planning and maternal and child care are also discussed. Lastly, careful consideration is given to the role of workers in other sectors, such as public administrators, social workers, teachers, community development workers and domestic economists.

138. Development and strengthening of services for the provision of health care, including maternal and child health and family planning, to the rural areas is the challenge that most of the developing countries are facing at the present time. Efforts are being made for the best utilization of existing skills and resources while development of further manpower and other resources continues. There is active interest among national and international bodies in the study of health service structure and functioning designed to introduce changes that can improve efficiency and effectiveness of health services. Use of managerial expertise to improve the quality of the care provided is an example of the efforts that are being made which improve coverage and utilization of health services.

139. If parents are to be motivated to plan their families, they require assurance that the children, in whom they invest so much, will survive and will grow up to be healthy and productive. Parents also require help in maintaining their own health. It appears clear that family planning is an important means of improving health. It is also increasingly clear that improvements in health can make an important contribution to family planning. This interaction carries the obvious policy implications that long-range integration of family planning and health is theoretically sound, is administratively practical and efficient and will produce greater impact upon the individual, the family and society.

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COMMUNICATION IN SUPPORT OF POPULATION/FAMILY PLANNING AND DEVELOPMENT

United Nations Educational, Scientific and Cultural Organization

1. Communication is an expression of human society; it is a fundamental characteristic of human beings to communicate. Communication is indeed necessary for learning, for transfer of experience, for inquiry, for dialogue and debate and for bringing about change. The role of communication is vital, particularly in the context of bringing about change of attitudes and behaviour. In this task, communication efforts are based upon the existing values and norms, while at the same time purporting to change them through the voluntary efforts of the people themselves.

2. Communication has a number of implications for development and communication strategies have to be included in any development-oriented activity—an activity which seeks to change human or social behaviour towards a better quality of life in a given period of time.

3. The application of communication techniques for the solution of diverse problems shows many correspondences of theme and approach. It is likely that, if methodologies are developed for the educational applications of media, the reinforcement of literacy programmes, the promotion of family planning, health and welfare campaigns or the prevention of drug abuse, the broad outlines of these methodologies will be similar and mutually supportive, and will use the same tools, often in the same environment and with the same audiences.

4. Consequently, a number of general principles have emerged. Among positions that have now gained general credibility are the interdependence of media, necessary linkages between mass and interpersonal communication, the need for integrated planning in both production and utilization, and the reconciliation of media strategies with country capabilities, traditions and practices.

5. Most important of all, perhaps, is agreement that the evolution of communication strategies requires a degree of co-ordinated planning and phasing which is equal to, and runs parallel with, the planning of development in general—in a sequence which begins with the identification of needs, the pin-pointing of resources and the study of audiences, and proceeds from the results of this analysis to a detailed plan of operations which is capable of modification after systematic evaluation and feedback.

6. Experience has shown, moreover, that the same elements are involved in all applied communication fields—the need to devise programmes that are equally relevant at national, subnational and local community levels, the importance of treating subgroups within communities as distinct entities with distinctive problems, the need to orient media practitioners towards development objectives and vice versa, and an overriding need to integrate various development endeavours.

7. Moreover, experience gained in numerous family planning programmes has clearly demonstrated the need for integration of family planning communication with other aspects of development communication and for the maximization and optimum use of resources, including expertise, institutions, agencies, projects and programmes in all communication sectors. It has also become abundantly clear that communication has to be treated as a continuum and not in isolated project terms.

8. The emphasis upon integration is by no means confined to the communication sphere; it is increasingly stressed in all development programmes in which the interests and disciplines of separate ministries and separate agencies are involved. There is, therefore, a great need to link population control to agricultural improvement, economic development, health and social welfare.

9. Integration is particularly essential in view of the limitations of the mass media. In most countries of the world outside of Western Europe and North America, radio and television are directly controlled and State operated, and the Governments have the power to use or not to use them for family planning purposes. The press and the film, though largely privately operated, reach very small parts of the public in developing countries because of illiteracy and the small number of cinemas and cinema attendances. In developing countries, even radio has limited reach. Forty countries in Africa and 20 in Asia have less than 10 radio receivers for every 100 people. As for television, 2 countries in Latin America have more than 10 receivers per 100 people and 20 in Asia have less than 10; although television now exists in 24 countries of Africa there are less than 3 receivers per 100 people in any of them.

Integration of family planning and developmental messages

10. Although a considerable body of knowledge about social and economic development programmes

existed at the time family planning programmes began to be designed, there were no models to be copied and, indeed, the application of lessons learned in other programmes were often counterproductive A case in point was the attempt to apply the model of diffusion of innovations from agricultural experience to family planning It was ultimately discovered that the sensitive nature of practices to be communicated in family planning simply did not fit the same pattern as in agriculture where practices are an open subject of universal interest and new farming techniques could be spread relatively easily.

11. Family planning, sexual behaviour, pregnancy and birth are not, in most societies, subjects of uninhibited public discussion Never before had a development programme depended so heavily upon communication to influence personal decision in matters so private and intimate. It is possible to demonstrate within weeks the personal benefits of improved seed, fertilizer and easy credit, yet even these need the help of massive public information programmes. The long-range personal and economic benefits of relinquishing ingrained traditional reproductive behaviour in order to control fertility present a far greater challenge to those who would use mass media and interpersonal communication to speed this change.

12. International assistance agencies were quick to offer their services to planners and administrators in developing countries seeking to design and implement family planning programmes However, unlike the situation in agriculture, health and other developmental fields, these agencies brought no backlog of experience —only a sense of urgency, experts from related fields and substantial amounts of funds

13 Typically, because family planning has been largely confined to health programmes, foreign assistance has made possible and often encouraged the formation of separate information and education units within the health infrastructure. In India, for example, although production of materials and broadcasting of family planning messages are handled in other ministries, the development of strategy and the allocation of resources is administered by a unit within the Ministry of Health and Family Planning

14 It is clear that family planning communication programmes have to be designed to meet situations which exist in any given country. One country can talk openly about birth control and human reproduction. Another country will have to approach the subject through family health, the welfare of women, a better life for children etc. There is room for both approaches, but the dual approach can be a brake on the effectiveness of communication

15 All this calls for an entirely new approach to communication, an approach in which the strategy involves an integration of developmental messages and media and above all, proper research into what people really think about family planning as it affects them individually.

16 A paper prepared by the United Nations Educational, Scientific and Cultural Organization (UNESCO), for the Second Asian Population Conference, recognizes the need for communication activities directly related to family planning, but calls for integration with other developmental issues over time:

> "Not merely has there to be an integrated communication approach at all levels of activity for planning to execution and evaluation but also in terms of messages because family planning messages in isolation cannot have meaning without their being an integral part of appeals directed toward attainment by the people of their personal aspirations and community goals. Thus, while UNESCO recognizes that in the face of a problem so gigantic as that of population growth communication programmes directly related to it have to be started, yet after the initial phase integration with communication programmes for economic and social development has to take place because, over a long period of time, family planning messages *per se* would have either to compete against other messages or become part of them "[1]

17 Family planning communicators typically wish to go directly to people with messages calling for action which they cannot be expected to accept apart from larger considerations of family welfare—such as making a living, educating the children or having a son to carry on the name.

18. It seems logical to assume that other developmental programmes cannot be expected to disseminate specific family planning messages unless those messages also relate to the goals of the programme involved. In a total development communication concept, each sector will have need to develop messages within its subject area, but based on the need for family limitation

19 Developmental workers are not paid for distributing family planning leaflets or organizing meetings to discuss family planning. In general, they will not be evaluated for their effectiveness in performing these [illegible]

the education and training of other developmental workers in such a way that they are more effective in their primary assigned tasks. The extent to which that can be done is a test of whether family planning can and should be integrated into other development efforts in any given country.

20 The differences between education and communication derive largely from the attempts to organize the processes within society and the different institutions involved in those efforts.

[1] "Review and assessment of major policies and programmes in communication services" (POP/APC.2/BP/29), background paper prepared by the Secretariat of UNESCO for the Second Asian Population Conference, Tokyo, 1-13 N 1972.

21. Saunders reinforces the common role of education and communication with a statement of five objectives for family planning communication:

"The *information* component of family planning communications will be directed toward individuals, groups or publics both within the family planning organization and outside it ... The distinction between informational and *educational* is not very sharp ... perhaps the basis of any distinction lies in the extent to which communications for education attempt not only to change knowledge, but to some extent also seek to change persons—to teach skills, to build habits, to establish new patterns of belief or behavior.

"*Motivational* communications will be those that aim to influence behavior indirectly by trying to change perceptions of wants to needs or by establishing a connection between family planning practice and the gratification of existing wants.

"*Legitimation*—creating a climate of opinion in which talk about sex and contraception is not considered furtive, embarrassing, shameful or 'dirty', but rather is viewed as commonplace and matter-of-fact, a climate in which contraceptive practice is accepted as being both respectable and proper.

"*Reinforcement*—for new knowledge and attitudes and reassurance about changed behavior. Decision makers need to know that in supporting family planning they have made wise and politically rewarding choices; users need to be reassured—that they are right in continuing usage; staff members of family planning programmes need encouragement and support and the assurance that they are performing satisfactorily."[2]

22. The skill which development communicators master is the skill of properly combining the ...gths of mass media and extension education. Inter...rsonal channels are invaluable as means of promoting maximum interaction and immediate feedback, both of which establish an atmosphere where attitude change is possible. Mass media, on the other hand, have the advantage of rapidly spreading information of high accuracy even though the message flows in only one direction. Mass media are more likely to be important in increasing knowledge and ideas, while interpersonal communication is more likely to cause attitude change.

23. The important implication, however, for population communicators is that mass media provide access to the interpersonal and group networks through which attitude change can be accomplished. The very fact that mass-media exposure is less in developing countries makes them a more significant influence in rural ... to mass media are

ıent communication. Much of the impact of a ily planning communication project is derived from 'elevance to other development projects, and family ınning communicators need to draw upon other elopment areas for the promotion of family plan- ; goals and practices

1. Family planning communication has thus to be ed to the extension framework for health, educa- ., social welfare, literacy programmes, farming in- nation, industrial development and housing schemes; it is only by planning for integration from the tral planning level right through to the practice in field that real interrelationship can be achieved and ained.

2. Whether the extension network is composed of ily planning communication workers, field-workers ched to other development projects, or both, the il situation is one where all personnel are welded ı a comprehensive programme for co-operation, so : they become more than the disparate units of a ;e number of central projects.

3. Whatever the arrangements for such co-oper- ın may be, it is up to the family planning agency to these relationships as comprehensively as possible . to establish contacts with and involve other devel- ıent workers.

4. Studies show that although the mass media can powerful persuaders, most people decide to act r discussion with friends, family and neighbours. ıs, though the information gathered through the dia may be convincing and thought-provoking, only ery small proportion of people change their behav- r or accept change, without reference to their cul- ıl and social groups, within which there are people) carry greater weight and are more persuasive than ers and set the pace for change.

15. As most people accept new attitudes and change ir behaviour once these are approved by their social l cultural groups, the importance of interpersonal ımunication and the need for direct contact by the ımunicators with influential group members is cru-

[illegible]

.ds of families.

16. In order that these locally influential people y play as full a role as possible in support of the dia, a comprehensive scheme to bring them into the ımunication network needs to be devised.

17 Opinion leaders should be identified and brought ether in a meeting with other influential members the community at an early stage to ensure their operation with the local family planning communi- ion programme.

18. The following four-step strategy for achieving ı objective could be followed:

(*a*) Provide the opinion leaders with the information necessary for a full understanding of the reasons for family planning, including its relationship to national and particularly local development;

(*b*) Involve them in the preview of radio and television programmes;

(*c*) Invite their suggestions for local activities;

(*d*) Invite them to open discussions about family planning in the community, whether formally or informally.

39. Once the local leaders realize the value of their co-operation they may also be able to pin-point the kinds of resistance which are likely to be met and suggest ways and means to overcome them.

40. The planned and systematic use of communication strategy composed of mass media and field-work helps to telescope change and ease difficulties of development. The prerequisites of such planned and systematic use are, first, that the media be supported by extension services and other traditional methods of communication; and, secondly, that development programming and development messages be realistically planned and co-ordinated.

Development of family planning communication strategy

41 In order to describe the actual and potential contributions of communication to family planning and population activities, it is necessary to view side by side, first, the emergence of communication as an increasingly distinct area of social science and in terms of the rapidly expanding media involved; and, secondly, the progress of family planning from its early confinement to individul initiative through later voluntary group action to the relatively recent governmental

[illegible]

media, i e., television, facsimile and satellite communication. It has also been largely in the past 30 years that scientific study has been directed to the process and effects of mass communication. The development of major theories about them reached its greatest intensity during the 1940s and 1950s.

[illegible]

included the Indian mass communication campaign characterized by the widespred use of the "four faces" poster and the inverted red triangle accompanied by the simple message, "Two or three, that's enough"; the Salvadorian PATER campaign, the principle message of which was "Have only the children for whom you can be a responsible parent"—that is, by providing adequate food, housing, education and religious upbringing; Hong Kong, where over 60 per cent of the women have their babies at hospitals or clinics and

over 80 per cent bring them to such facilities for examinations; and the Republic of Korea, where well-trained field-workers make home visits, arrange community meetings and exhibits and distribute both informative and educational materials and contraceptive supplies. It is clear from these examples that these two distinct approaches have either laid emphasis on mass media alone, as in India and El Salvador, or basically on extension work, as in Hong Kong and the Republic of Korea.

43. By the late 1960s, several factors focused attention on communication as an undeveloped resource in population and family planning. These factors included unsatisfactory acceptance rates among women of reproductive age, under-utilization of services available, lack of continuation of methods once they were adopted, and the spread of rumors based on isolated, often false reports of experiences with contraceptive methods.

44. A conference sponsored by the United Nations Economic Commission for Asia and the Far East (ECAFE) at Singapore in 1967, devoted to discussing the communications aspects of family planning programmes, developed a means of classifying communication approaches or strategy in family planning. Three different stages were identified:

"(*a*) Voluntary agencies are solely responsible for conducting family planning with no official recognition or government support;

"(*b*) Family planning is recognized tacitly but with lack of official policy;

"(*c*) Family planning is a full-fledged government policy." [3]

This classification system was used by Schramm [4] during his world-wide survey of communication in family planning. The survey showed that the first priority in any campaign consists of leaders, those who have the responsibility for national policy or for building voluntary support. Here, the preferred media are personal conversations, letters or reports on the population problem. Later, as clinical resources become available, the audience shifts to medical and paramedical personnel, and the channels will include training courses, seminars and manuals, supplemented by material for distribution describing the services. When it becomes possible to carry the programme to the people, the emphasis shifts to field-workers who must have training resources and text materials along with demonstration and educational materials. Once a national policy is established, mass media can be utilized first to inform the "ready" people and then the less informed and hesitant. After the "ready" audience has been reached, the acceptor rates begin to drop off and the time has come to think of special groups and special tactics. Campaigns that not only inform but persuade are needed for such people as are interested and approve of family planning but never go to the clinic, or those who use contraceptives but discontinue, or men and young people who have been neglected in information campaigns.

45. It is well known that in the initial phases of a programme the number of acceptors goes up, but as time passes more and more efforts are needed to convince those who have not yet accepted for various reasons. It is at this stage, known as the "post-plateau period", that family planning information campaigns and strategies face a challenge. "Inasmuch as a number of countries are now reaching a plateau of acceptance, communication is being called on to shoulder more and more responsibility for the success of programs." [5]

46. The classification suggested by the ECAFE working group in 1967 is still a useful system because it helps suggest how the various communication media can and should be built into campaigns. As pointed out, [6] television and radio are not usually readily available to voluntary organizations which are moving cautiously into programmes of social change where undue publicity might arouse apprehension and even hostility. At the first stage, word of mouth, group meetings and personal contact are important.

47. At the second stage, however, it may no longer be necessary to be so cautious, so use of the news media can be encouraged. Here, displays, signs, exhibits and the like are appropriate. Field-workers are often used to visit homes, clinics and hospitals to interest potential users and answer their questions.

48. At the third stage, where a national policy fully supports family planning, a comprehensive public information and motivational programme is called for. Usually, mass media can be freely used in combination with group and personal approaches. It probably will always be true, however, that use of mass media will vary according to how long the policy has been in effect, the extent of modernization and current events, particularly those affecting cultural and racial minorities.

49. From the guidelines suggested above, one can then gain a generalized picture of the communication strategy being followed in countries or areas by their position in the table given below:

Official policy	*Support, but no policy*
Bangladesh	Afghanistan
Barbados	Bolivia
Colombia	Botswana
Dominican Republic	Chile
Egypt	Costa Rica
Fiji	Cuba
Ghana	Dahomey
India	Democratic Republic of Viet-Nam
Indonesia	Ecuador
Iran	El Salvador
Jamaica	Gambia
Kenya	

[3] *Communications in Family Planning: Report of a Working Group* (United Nations publication, Sales No. E.68.II.F.17), para. 203.

[4] W. Schramm, *Communication in Family Planning*, Reports on Population/Family Planning, No. 7 (New York, Population Council, 1971), p. 10.

[5] *Ibid.*, p. 2.

[6] *Ibid.*, p. 10-11.

Official policy	*Support, but no policy*
Malaysia	Guatemala
Mauritius	Haiti
Mexico	Hong Kong
Morocco	Honduras
Nepal	Nicaragua
Pakistan	Nigeria
Philippines	Panama
Puerto Rico	Republic of Viet-Nam
Republic of Korea	South Africa
Singapore	Southern Rhodesia
Sri Lanka	Sudan
Thailand	Uganda
Trinidad and Tobago	United Republic of Tanzania
Tunisia	Venezuela
Turkey	Western Samoa

No policy, no support

Algeria	People's Democratic Republic of Korea
Brazil	Peru
Burma	Saudi Arabia
Cameroon	Senegal
Ethiopia	Syrian Arab Republic
Iraq	Upper Volta
Khmer Republic	Yemen
Madagascar	Zaire
Mali	

50. It is unlikely that the 1970s will see a repetition of the rush by Governments to declare policies favouring family planning as they did in the previous decade. This is not to say that the trend will not continue; indeed, the action by Mexico, a major Roman Catholic country, in declaring a national policy effective 1 January 1973, suggests that more Latin American countries might eventually follow suit. It is more likely, however, that most countries will simply choose to tolerate or support family planning without taking a policy stand.

51. Given this assumption, there is need for a new means by which to classify the population communication efforts of countries, one which stresses the development of over-all national strategy rather than tactics and activities Under a suggested scheme for such a classification, the countries with national family planning programmes would be classified as follows·

A Countries with autonomous family planning co-ordinating bodies:

- Indonesia
- Malaysia
- Philippines

B Countries in which the communication component of family planning programmes is carried out within the Ministry of Health·

Chile	Jamaica
Colombia	Mauritius
Costa Rica	Morocco
Dominican Republic	Nepal
Ecuador	Nicaragua
Egypt	Pakistan
El Salvador	Singapore
Fiji	Thailand
Guatemala	Tunisia
Honduras	Turkey
India	Uganda
Iran	

C. Countries or areas in which the family planning communication programme is carried out outside the Ministry of Health:

- Ghana
- Hong Kong
- Republic of Korea

52 [illegible] confuse [illegible] develop [illegible] has been initiated and conducted by external persons and institutions, further resulting in confounding decisions on priorities. A number of countries have begun to solve this problem by establishing national co-ordinating bodies which, though they vary in practice, generally seek to develop common objectives, maximize the effectiveness of foreign aid and mobilize internal resources. In terms of communication strategy development, these national bodies are among the most significant factors to come on the scene in the 1970s

53. By operating at the policy level and because they transcend any given ministry, they are able to [illegible] with private organizations

Considerations in implementing communication strategies

54. The foregoing review shows the steps taken in various countries or areas for the development of structures for the implementation of communication strategies for family planning and development.

55 Once a Government decides upon the organization it needs, in accordance with its administrative traditions and strategies for national development, the basic considerations in implementing communication programmes need to be taken into consideration.

56. Needless to say, a communication programme for the promotion of development goals must be timed to suit the availability of services and the level of awareness of the audience.

57. Programmes urging people to make use of family planning facilities may do more harm than good if services cannot cope with the demand created by a media campaign A television programme describing the benefits of family planning is unlikely to be acceptable if contraceptives are not readily available. The communication programme must be timed to provide the kind of information required when it is needed and when the extension services necessary to make the limitation of family size practicable are available. There is another reason for the deliberate planning of the media programme As well as catering for the level of awareness of the population (and of different sections of the population), programmers need to make the best use of resources They need to draw up realistic budgets and to develop those aspects of the mass media which are most effective For instance, if television is avail

to only a few city areas or to middle class homes, it may be best to make use of radio and print media only, or radio alone.

58. A communication programme that is designed to assist the development process must therefore fulfil the following criteria:

(*a*) It must be timed to tie in with the development programme as a whole;

(*b*) It must make the best use of media resources;

(*c*) It must suit the level of awareness of the audience.

59. Such a communication programme is required to inform people of changes brought about by development, to create an awareness of the need for change and an acceptance of change itself. Development, when the term is applied to the country, or to the individual, means change: change in life-style; change in attitudes; change in behaviour.

60. The role of the media in development communication is to ease the problems brought about by change and to encourage people to develop favourable attitudes to the new life-style which is being offered. Ultimately, the communication programmes seek to bring about modifications in behaviour which will accelerate the acceptance of the new way of life which development has brought about.

61. For developing a media strategy, a number of useful models are available which set out the processes which individuals pass through before they accept a new idea, attitude or set of behaviour. The first of these, drawn up by sociologists, categorizes the diffusion process (which leads to widespread acceptance of change) into five stages:

(a) *Awareness*: the individual is introduced to the idea for the first time; that is, an innovation, a development or an idea is introduced, and the individual is made aware of the existence of the development;

(b) *Interest*: the interest of the individual is aroused and he seeks further information about it;

(c) *Evaluation*: the individual, armed with further information about the "new" object, subject or method, assesses its relevance to himself, purely on theoretical grounds;

(d) *Trial*: the individual tests the "new" area for himself;

(e) *Adoption (or acceptance)*: the new idea, method or object is accepted by the individual and his behaviour changes accordingly.

62. In this case, all that has to be done is to devise a media strategy that fosters awareness, provides more information when interest is shown, shows the relevance of the innovation to the individual and directs people to places where the new methods can be tried and ultimately adopted.

63. However, it is difficult to categorize sections of the population in this way. There will be people who adopt a new idea because it is new, those who go on evaluating and those who are interested and then lose interest. In any social or cultural setting there will be those who set the pace for change, those who come in a little later and those who join at the very end. However, most people go through stages of acceptance which approximate those described, even though the length of time it takes for them to accept innovation may differ.

64. Apart from the diffusion process, the communication strategy for the acceptance of innovation can also be based on a list of measures which can be taken by Governments to encourage acceptance of development goals. In the area of family planning, these may be:

(*a*) Measures that change circumstances (housing restrictions based on family size, compulsory education, taxation for large families);

(*b*) Measures that may change the perceived relationship of family size and birth spacing to existing goals, values and circumstances (making known the fact that large families will be unable to reap the benefits of development programmes, making known the relationship between maternal health and family size);

(*c*) Measures that promote changes in goals and values (improvements to the status of women, equal educational opportunities, social security provision);

(*d*) Measures that promote changes in birth-control methods (new methods of contraception and increased availability of contraceptive services).

65. The development of a media strategy based either on the "diffusion" model or on the "measures" will help to organize programming and to identify audience groups. However, in either case, the two elements among others that the strategy should include are population education and the use of folk media.

Population education

66. An important consideration in developing a communication strategy is the role of population education, which is increasingly being promoted among educators and population policy planners as a means of preparing the younger generation for a more informed approach to population and family planning matters. Such education may be classified into three areas: sex education; education for family living; and population awareness.

67. The objectives of population education are to give the learner an insight into the totality of issues connected with population, including the nature, measurement, causes, determinants and consequences of population growth at family, community, national and world levels, as well as the possibilities of planning family size and population growth.

68. The first major international conference convened by UNESCO to consider population and family education (Bangkok, 1970) considered four areas of concern: (*a*) introduction of potential content; (*b*) defi-

nition/objectives of population education; (*c*) preparation of curricula materials; (*d*) issues relevant to implementation

69. The workshop developed one of the first and perhaps the most succinct definitions of what population education should be expected to achieve:

"Population education is an education programme which provides for a study of the population situation in the family, community, nation and world, with the purpose of developing in the students rational and responsible attitudes and behavior toward that situation." [7]

70. The rapid development of interest and participation in population education, particularly in Asia, along with a parallel interest in non-formal or non-school education on the part of population communication personnel, has caused each group to focus on what the interfaces should be

71 It appears certain that population education in educational programmes outside schools will become increasingly important in the future. Instruction will need to come from a wide variety of related interests, including medical doctors, nurses, public health workers, co-operative workers, community development staff, literacy programme personnel and armed forces staff.

72. From the point of view of an immediate influence on reproductive behaviour, the target group that is most crucial for a population education programme consists of out-of-school youths and adults who are on the threshold of, or in the midst of, their reproductive years While it must be recognized that they are most elusive to reach, it is essential that they should be reached, and a comprehensive programme of communication and population education has to take account of them, not only now, but in the future as well Even after population education has been established at the school level, the problem of drop-outs from schools will continue to be such that many, not reached through school programmes, will have to be reached through communication programmes for out-of-school youths and adults. Moreover, even in the case of those who have been reached through school programmes, it may be necessary to ensure a strengthening and reinforcement of their awareness of the insight into population issues in the years of adult life when personal decisions have to be taken about reproductive behaviour.

Indigenous media

73. Yet another important element which should not be lost sight of in developing communication strategies is the organized use of folk media Recently, more attention has been given to traditional means of communication for social and health education. Those in charge agree that these methods can be of value if they and their cultural setting are well understood by communicators

74. Traditional media come from the people and antecede the mass media Their appeal has historically been both functional and aesthetic. They have always served to entertain, educate and reinforce existing ideas or ideologies or to change existing values or attitudes They tend to invite audience participation and, beyond informing, they can inspire people.

75 Being close to the people at the local level, these channels retain the capacity to be used in the service of social concerns as determined by local, provincial or national authorities In addition, they tend to be relevant to the people in the sense that they are conventionally acceptable. They are also abundantly present in areas where mass media technology has not been fully or effectively developed to capture sustained interest at the local or even at the provincial and national levels. Costs of supporting traditional forms are minimal

76 Limitations in the use of such forms lie in overloading the channels with too many messages of an instructional nature However, little is known about such limitations. Concern must also be given to the possibility of distorting the original meaning and purpose of traditional media Some evidence indicates that the puppeteers of Indonesian *Wayang Kulit* cannot risk the chance of losing their credibility with villagers by introducing family planning messages. It may, in this case, mean training an entirely new group of puppeteers for the purpose

77 One of the four meetings of international experts convened by UNESCO in 1972 dealt with the integrated use of folk media and mass media in family planning and communication programmes [8] The meeting recognized that both the mass media and folk media had developed their own styles and forms and that, while the former could extend the size of the audience of the folk artist, the latter had the great advantage of enriching and diversifying the content of the mass media.

78. It was observed that communication programmes had previously concentrated on the utilization of the field-workers of health and agriculture programmes for extension of the family planning message. It was emphasized that while that should continue, folk media should be added as extended channels for such workers, which would enhance innovative approaches and capitalize on trusted folk media and folk performers for family planning

79 The meeting concluded that communication strategy embodying the co-ordinated use of both types of media would result in the creation of a climate for acceptance and better realization of the concept of family planning and of services, as well as that for other kinds of activity in the field of population

[7] UNESCO, "Population and family education", report of an Asian Regional Workshop, Regional Office for Education in Asia, Bangkok, 1961

[8] UNESCO, Experts Meeting on the Integrated Use of Folk Media and Mass Media and Family Planning Communication Programmes, London, 20-24 November 1972

80. Steps need to be taken for the organized use of folk media in national family planning communication programmes. Folk media, being based in local communities, have the vitality and potentiality for serving as the extension arms of the mass media. Also, when used carefully for motivational purposes in communication programmes for family planning and development purposes, they could contribute also to cultural development.

Training, research and evaluation

81. Training essentially meets needs that education and experience cannot adequately provide. It resembles both education and experience, but is different from either. The primary goal of training is to produce changes in knowledge, in attitude or in behaviour. Institutions that engage in training can make it more effective by recognizing its unique requirements and opportunities.

82. Training has, since the beginning of organized family planning programmes, received attention as a major determinant of success. Since such programmes have been generally under the direction of medical personnel, much of the early training consisted of instruction in clinical aspects of contraception and human reproduction. Subsequently, as field-workers came into the picture, training became broader based and began to deal with the complex of subjects that make up family planning.

83. The most common practice in developing countries is to have a system of training institutes, usually featuring a national training centre, state training centres and often regional centres dealing with the range of concerns for which programmes are responsible. The functions of a national centre may include co-ordination of the national training programmes, developing basic curricula for use in training different categories of personnel, training trainers, training special groups, providing advisory services to regional or provincial centres, preparing training aids, serving as a clearing-house on training information, evaluating training programmes, conducting research to evolve more effective methods of training and organizing seminars and workshops for improving the competence of trainers.

84. Regional training centres assume the responsibility for training personnel within their geographical areas. Typically, their faculties spend time in the field, consulting with and guiding field personnel, testing job descriptions, developing curricula, modifying curricula, evaluating training in terms of job performance, organizing refresher courses on specialized aspects and conducting research.

85. Family planning training institutions are largely inadequate to meet the current needs of programmes which place high priority on information, education and communication activities at all levels and among all personnel. Sweeney states the problem plainly as it relates to the communication training needs of programmes:

> "One of the parts of family planning programmes that causes me concern is the training of communicators, particularly field workers. Field workers are generally trained by services personnel or by people who come from the services part of the programme. Let me draw an analogy. Your local automobile dealer has a services department and a sales department. Imagine the conversation you would have with the salesman who has been trained by the services manager. In no time at all you would be on a dolly under the automobile looking at the engineering and then standing in awe as the services-trained salesman lifts the hood and carefully explains all the working parts. Personally, I would rather know what the automobile could do for me in daily life." [9]

86. Communication training is often thought of as having application only to those workers whose job titles specifically commit them to tasks involving public information or informal education, often described as motivation. Thus, those staff members who deal with mass media and those field-workers whose duties involve persuading people to accept new practices are seen as communicators and therefore as subjects for communication training. A more enlightened view is that every category of staff at various levels should receive communication training. Although the content and methods of such training have already been specified by UNESCO, [10] what remains to be done is to lay down the criteria and standards for institutions which could undertake such training.

87. Estimates of the number of studies in population communication vary widely but it is fair to say the total extent of such research is not known. This is emphasized by the fact that much social science and media research is applicable to population and family planning but requires that someone go to the bother of searching it out and suggesting appropriate applications.

88. A general short-coming of population communication studies is that they often do not deal with strategy or—if they do—it is not projectable to the whole of the area, whether it be province, region or country.

89. A meeting of experts on research in family planning communication [11] identified nine areas, which, in terms of priority, are as follows:

(a) *Research in the adoption process of family planning practices*: it was hoped that research in this area would help answer the question of why, in many

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[9] W. O. Sweeney, "A blueprint for programme planning for population communication", paper prepared for a Work-Planning Conference, University of Chicago, Community Family Study Center, 16-17 December 1971.

[10] UNESCO, Experts Meeting on Training of Family Planning Communicators, Honolulu, 9-13 October 1972.

[11] UNESCO, "Research in family planning", Experts Meeting on Research in Family Planning Communication, Davao City, Philippines, 24-28 October 1972.

locations, there is widespread knowledge and favourable attitudes, yet low acceptance, which research might also help describe the similarities and differences between diffusion and adoption practices in family planning and other innovations such as in agriculture;

(b) *Communication strategies for improving continuation rates*: the research area should deal with the difficult communication problem of rumours and it will likewise contribute directly to the development of strategy,

(c) *Designing and testing more effective family planning message strategies*: this area should deal with the content of messages delivered through the widest possible variety of media, socio-linguistic considerations, style or treatment of messages, and the co-ordination of mass media and interpersonal approaches,

(d) *Integration of family planning with other developmental programmes* this area would help answer the questions whether family planning goals are best met by building a separate infrastructure or by utilizing existing channels, audiences and sources, and it would explore the ways in which family planning messages can be integrated into those of education, agriculture etc.;

(e) *Communication strategies with opinion leaders*. research in this area would probe the role of the influentials at all levels of society in diffusing family planning innovations and it would help to determine the relationship between mass media and opinion leaders, giving attention to the role of incentives, and also exploring the possibility that opinion leadership may be decreased when family planning field staff overly concentrate their activities on their leaders,

(f) *Information acquisition and processing behaviour*· studies are needed that document how audiences receive information and how it is processed by individuals, all against the social psychological background of the culture;

(g) *Communication effectiveness of family planning personnel*: the most successful national programmes have stressed a large group of well-trained field-workers; yet, there is little research on the communication role of such staff and while local conditions will vary, research is needed on the relative communication effectiveness of family planning personnel with regard to recruitment, selection, training, supervision, targets, motivation, perception and reward systems;

(h) *Communication aspects of population education*. answers are needed to the question of how much stress should be placed on the possibilities absorbed by school and non-school education programmes, little being known about the most effective ways of reaching out-of-school youth;

(i) *Communication components supporting innovative approaches*. many countries are experiencing plateaux in numbers of new acceptors, as well as having increasing numbers of discontinuances; here, incentives and possible increased use of commercial marketing and research facilities are possible areas of investigation.

90 Action research is of particular importance. Action research is carried out while the programme is under way, and the results are fed into communication channels as quickly as possible

91. As a whole range of media approaches is likely to be involved in a multimedia approach to family planning communication, there is an urgent need for research into the comparative effectiveness of different kinds of approach.

92. The need for taking into account social and cultural factors when devising media approaches is vital. Research would be needed to analyse the cultural factors which might work for or against the acceptance of family planning in the local context. Family planning communication may attempt to strengthen motives for small families and to weaken those for large families For mounting an effective communication programme, the need is to know what these motives are and which approach to motivation and information would bring about a change in attitudes, knowledge of and about the target audience and its attitude to family size is needed In order to use media to change these attitudes, one needs to know which media are available to the target audience, which programmes are listened to most and by whom, what styles of presentation are most effective and most popular, and which media are most credible Knowledge is also needed as to the kind of exposure the communication materials require and how frequently the messages have to be aired if they are to lower resistance.

93 Once the communication programme has been mounted, there is a continuing need for research into the effectiveness of particular media approaches in persuading target groups, and to ascertain whether these approaches themselves are informative, colourful and convincing enough.

94 Another aspect of research in family planning communication is the transferability of the findings. There have been a great number of communication projects, but very few provide guidelines for the development of programmes in other areas and country situations Research material should be collated and presented in such a way that it can become a permanent record and a reference for communicators and development workers in other projects. The way in which research data are presented is important. Valuable information should be presented in such a way as to be meaningful to professional, influence and political groups, for it may affect the way in which they treat the idea of family planning communication and allocate resources for it.

95. Family planning communication programmes are designed to produce attitude changes and to influence behaviour in groups of people who may or may not be receptive to change. The success of this rather intangible aim can only be evaluated through m ure-

ment of the impact of the programmes which are then related to the resources expended. Measurement is not easy, but one cannot give up simply because the variables of interest are hard to quantify. The challenge becomes one of finding reasonable indicators or surrogate variables which can serve as approximations of the variables of real interest.

96. Family planning communication is a two-way process. Family planners have information for the audience and the audience has information for them. Communication programmes that forget this principle could easily degenerate into mere propaganda, and audiences quickly tire of propaganda.[12] A good evaluation programme is, therefore, essential to a good communication programme. It provides the basis for both control and learning: control in the sense that the communication programme can be modified on the basis of the feedback obtained; learning in the sense that it will be possible to transfer experience between programmes. If such experience is not documented through a formalized evaluation procedure, the danger is that a subsequent programme will be planned without taking into account the results of any predecessor. People in the field are often too busy implementing the communication programme to worry about evaluation. This implies that special steps must be taken to ensure that responsibility and resources shall be provided for this important function.

97. The following elements are always necessary for evaluation:

(*a*) Perform environmental analysis to identify opportunities for action;

(*b*) Set goals and priorities (goals defined for the communication programme as a whole);

(*c*) Define these goals into operationally meaningful objectives and at the same time determine the interrelationships between such objectives;

(*d*) Isolate and analyse the critical decisions and operations which are necessary to carry out the operational objectives;

(*e*) Choose and describe the appropriate control variables which are necessary for monitoring decisions and operations;

(*f*) Define operationally meaningful measurements to generate the appropriate reports;

(*g*) Design an information system for:

- (i) Data gathering;
- (ii) Data recording, storing and transforming;
- (iii) Report and information generation, with a special emphasis on generating and transmitting on a continuous basis, including information to managers, and taking over all the repetitive aspects of managerial planning and control, so that those in charge of implementation can get out of "fire-fighting" and get down to the real business of planning.

98. Planning and control of a communications programme is done at different hierarchical levels. The principal linkages between decision-making levels need to be made explicit in order to show the main information flows.

99. The main connecting link is through control variables and objectives. The control variables identified on the higher level will be the objectives on the lower level and so on, down the line. The linkages between higher and lower levels have to be maintained both through direct contact and through a formalized information and planning system. It is important that objectives are set in a co-operative mode and not assigned arbitrarily, if people on a lower level are to feel committed to their achievement.

100. Evaluation is linked to the programme's specific objectives and attempts to discover how far those objectives have been reached and how effective the techniques for reaching those objectives have been. To be meaningful, it must be continuous and carried out in a scientifically reliable way and family planning communication programmes should have the necessary expertise for the purpose. Particular attention needs to be paid to training field-workers in evaluation methods. Social scientists working in development programmes can be of assistance in setting up training programmes.

101. The involvement of marketing research organizations in evaluation should not be overlooked. Questions on media use can be added to the questionnaires whenever an appropriate marketing survey is being mounted. Personnel from commercial research organizations and advertising firms are often valuable in the preparation of evaluation programmes and may be involved from the inception of a promotional idea.

Organization and management

102. The organizational problem for family planning and development communication programmes is twofold:

(*a*) The organization and administration of an overall family planning and development strategy, bringing in all agencies concerned with the development process; for example, health, education, family planning, town planning, transportation and sanitation, communication, rural development and industrial development may all be the responsibility of separate and independent agencies, or may be off-shoots of a larger, more powerful, single agency;

(*b*) The specific planning for the media through channels which may be Government-owned or private organizations, including film enterprises, television channels, newspapers and magazines, radio stations and the various agencies concerned with the production of tapes, slides and cassettes.

103. Family planning itself is often a function of the Ministry of Health, or of a larger unit dealing with

[12] *Family Planning Community Education Programme, Manual* (Indonesian Planned Parenthood Association, May 1972), p. 11.1.

social welfare. In other instances, family planning is carried out by a specially constituted department or agency, which may be statutory, voluntary or a combination of both. In this case, the agency involved may be a new Ministry or a group of Ministries or even a central planning unit.

104. The kind of relationships that can be forged between family planning and other developmental projects are, to some extent, dictated by the kind of administrative arrangements which already exist.

105 As for media organization, the simplest simplest situation is where all the media are controlled and financed by the Government But there are enormous ramifications possible in the organization of private media channels, which may be controlled by separate commercial groups. Some co-operation may be established between media organizations and other agencies, such as education departments; but this kind of relationship is likely to be limited and extremely specialized.

106 In other cases, there may be a mass media department at a central level which has censorship and some financial control, but which is not directly responsible for media outlets.

107. Since family planning is a highly complex aspect of development, it needs sustained and concentrated effort for the dissemination of its message Because family planning communication has its own particular aims and goals, and has specific requirements and methods, the responsibility for it cannot be spread too widely. Where each development department has its own family planning programme, family planning is likely to become a secondary consideration and may even be lost sight of as each development area pursues its own goals

108 What is required, then, is a combination of two elements, at different levels of operation. At the centre, there needs to be an over-all development policy-making body which is responsible for the co-ordination of the development programme as a whole. This agency must recognize the social and economic importance of population growth rates as they relate to the total development programme. It must also be aware of, and be able to foster, the interrelationships which exist, and are to exist, between the family planning programme and other development areas

109. The second element is the specialist agency, concerned with the development of a family planning programme alone, but which is able to draw upon and bring together the appropriate resources in other agencies which are related to the family planning programme.

110. While the specific nature of the administration of communication activities in the family planning programme will vary from country to country, the essential principle is that the application of communication to family planning—or any other development programme—is a specialized operation and should be under the direction of communication specialists. Though these specialists should necessarily be under the direction of over-all programme administrators, they should serve the role of advisers to those administrators as well as be in charge of planning and conducting communication activities. It is recognized [illegible]

ground and education National programmes will necessarily have to rely on the best talent available from media agencies, on the one hand, and from institutions dealing with the social sciences, on the other.

111. Unless the head of the communication unit is given equal status with that of the head of services, it is unlikely that communication support will ever be given the attention it must have in the future. There is no reason to believe that programmes administered by health and medical personnel will have built in the behavioural dynamics necessary to reach programme goals.

112. Too often, the communication units of national programmes have been satisfied to deal in mass communication rather than comprehensive communication support. Specialists added to these units have often been deputed by broadcasting operations, newspapers or other public information agencies. Few examples exist where a staff of public information specialists work side by side with specialists in informal education to design and produce messages and materials for all channels available in the country. Generally lacking also are personnel who understand and appreciate innovative methods, such as mass mailing, advertising, market research and other methods common to the commercial world.

113. Bogue[13] recently called for central communication units with internal structures which would include: (*a*) planning and creativity; (*b*) production, (*c*) research and evaluation Under the production unit would be a provision for dealing with the public media, a mass mailing unit to reach selected audiences directly and activities related to education in schools, adult education and literacy programmes and other channels.

114. The world-wide situation concerning administration of information, education and communication programmes is not optimistic. It is generally agreed that of the some 40 countries with official programmes, less than 10 have a communication unit at the national level which is equal in status to the clinic services unit. Equally serious is the situation that prevails even more generally, in which communication training is under the planning and direction of non-communication personnel. Given these circumstances, it is difficult to bring communication effectively to bear on the crucial needs of programmes.

[13] D J. Bogue, "Report of the Conference on the Communication Support Outlook for Population Programmes in the 1970's", University of Chicago, 16-17 December 1970.

BARRIERS TO IMPLEMENTATION OF FAMILY PLANNING COMMUNICATION PROGRAMMES

115. Twenty years of organized national family planning programmes have provided sufficient experience and revealed major barriers to their successful implementation. Programmes that have recently been initiated or that are going to be launched could take special note of these barriers and plan accordingly. These barriers are as follows:

(*a*) Family planning and population programmes have been advocated mainly in terms of fertility behaviour and demographic objectives and little or no action has been taken to advocate them in the context of human rights, the rights of the child or status of women;

(*b*) Lack of commitment by responsible public officials to family planning, as a concept or as an essential national programme, too often derives not from an understanding and appreciation of the implications of rapid population growth for the accomplishment of national goals, but from narrow fear of loss of political influence, so that even though 24 countries have declared national policies and 23 more have unofficially supported family planning activities, these policies and positions have too rarely been strongly supported by political leaders in power, the result being that family planning programmes generally receive low priority, and little government funding, and their personnel remain limited in number;

(*c*) Family planning has almost universally been defined as a health activity, and the involvement and participation of other development agents has yet to receive due attention and to have their role clearly defined in the implementation of family planning programmes;

(*d*) Unwillingness to attempt innovative approaches, so that although contraception has been known and practised for centuries and fertility has decreased in western countries in the absence of family planning programmes, most programmes in the developing world fail to recognize that a substantial proportion of their people have to want fewer children, as well as to have access to the appropriate knowledge and means; and the conviction that few children are preferable to many is not widely held in a number of developing countries, although neither is it absent in any.

116. The idea of demand creation or, as sometimes described, a marketing approach to family planning based on shared preference for small families, is not well developed. In general, family planning programmes have not recognized the value of utilizing the private and commercial sectors, have not evaluated the advantages of incentive and disincentive schemes and have not begun to use the modern menagement tools which can significantly improve over-all planning, administration and supervision.

117. Only recently has attention begun to be focused on the factor that many feel has been largely missing in adequately linking family planning and population programmes to national development and improving acceptance rates. This factor is the application of communication, in its broadest interpretation, to population and family planning programmes.

118. It is not surprising that models for such application were not available at the time Governments began giving major attention to fertility control. They have taken considerable time to develop. Applications of communication to agricultural development, for example, have been more rapidly adopted.

119. As in all aspects of family planning programmes, there are major barriers to the successful application of communication. For example, the information, education and communication components of family planning programmes have not been adequately funded and staffed to permit them to fulfil their potential of support. This lack has resulted in communication programmes that are insufficiently planned, too small in scope and often inappropriate in content and mode of presentation.

120. Further, while the training of personnel to fill the growing needs for communication talent and skills, both for developing country programmes and among agencies extending assistance to those programmes, is inadequate, unco-ordinated and poorly funded, little effort has been made to encourage field-based training or to upgrade institutions at national level for the purpose.

121. There is an absence of research. Training of research personnel and utilization of research in most country programmes are health-based, with insufficient involvement of other agencies or ministries connected with development.

122. The development of national (public) programmes has restricted rather than promoted the utilization of private commercial methods and resources. The great majority of contraceptive users in the developed world and an estimated 40 per cent of contraceptors in the developing world obtain their supplies through non-clinical outlets; yet, these resources are not being exploited in developing countries.

123. Communication strategies have not always taken account of the limited accessibility of media to rural masses in developing countries or of the great potential of field-work or of community channels of communication.

124. Family planning communication programmes have not been planned with or integrated into communication efforts connected with other developmental activities.

125. The growing number and variety of international assistance efforts is often unco-ordinated, resulting in confusion at country levels. The types of assistance available and the mode of access to them is not well understood. The aid-giving agencies themselves differ as to the best methods for utilizing available assistance in the most effective ways.

126 Communication technology is expanding dramatically; yet, the major benefactors are the developed rather than the developing countries New technology has in many cases proved its cost-effectiveness, yet is resisted on the basis of the costly initial investment.

RECOMMENDATIONS FOR ACTION

127. A broader interpretation of population programmes and policies than one merely in terms of fertility behaviour or demographic objectives is called for and communication efforts should be intensified to set them against the background of human rights of the child and the status of women and in terms of development.

128. Research and subsequent training should be directed towards discovering the means of effectively combining the advantages of mass media with the inherent strengths of interpersonal communication for more adequate support of family planning and population programmes.

129 Any development of a world-wide population/family planning institute or centre should make allowance for adequate attention to research, training and service in the application of communication to programmes

130 Active support and encouragement should be given to efforts to identify, process and disseminate research results which are relevant to family planning programmes This process would include rewriting and otherwise putting such results into forms that administrators can readily use Likewise, it includes capitalizing on systems developed by programmes which have been successful in utilizing research results to alter programmes

131. Systematic review and comparison of communication activities and developments in family planning should be sponsored to learn what is effective under which conditions and at what cost.

132. Encouragement and support should be given to multidisciplinary research, which goes beyond most KAP studies and reveals conditions conducive to high and low fertility against a backdrop of response to communication. International agencies, in particular, should encourage and support study of family planning communication in connexion with the delivery of contraceptive services. This would include free offers, coupon systems, mass mailing, kits for newly-weds and other innovations

133 Communication specialists and researchers should be encouraged to engage in family planning as an area of study and application.

134. Studies need to be conducted to determine the most effective use of change agents or mediators between mass media and local audiences

135. Training facilities need to be developed at national levels for integrated use of communication for family planning and development. Assistance is particularly called for in developing the philosophy and the practice of placing communication training under the direction and implementation of communication specialists.

136 Considering the paucity of trainers, on the one hand, and of trained personnel, on the other, an international reservoir of advisers and consultants in the application of communication to family planning and population planning programmes should be developed.

137. Manpower development being of high priority in development programmes, and especially in the implementation of family planning programmes, criteria need to be developed by UNESCO for accreditation of institutions at various levels for undertaking training of communication personnel, if necessary providing assistance to upgrade such institutions. Efforts need to be concentrated not only in assisting in the training of communicators for family planning and development programmes, but more specifically to enhance national manpower resources for research, training and evaluation.

138 Particular attention needs to be paid to developing administrative and management systems which will ensure effective application of communication based on sound management as well as communication principles

139 New and innovative approaches to the application of communication should be encouraged at the national level Among the innovative approaches for development and implementation of communication strategies, attention may be focused on folk media and on experimentation with new technology with a view to adapting them to the needs of developing countries

140. A network of institutions and agencies in the field of population education needs to be developed in the context of the total educational reform and as part of communication work within those sections of the communities not covered by formal institutions

141. In order that national programmes may develop expeditiously, knowledge and experience, specifically in the field of communication materials, should be exchanged between countries For this purpose, efforts should be made to ensure the free flow of materials through international agencies

ORGANIZATION AND ADMINISTRATION OF FAMILY PLANNING PROGRAMMES

United Nations Secretariat *

1. The purpose of this paper is to present a comparative overview of the national organization and administration of family planning programmes. Reference is made to the main functions to be performed in family planning programmes, alternative organizational arrangements for carrying them out, the major problems encountered in organization and administration, attempted solutions, lessons learned and priority areas for future action.

2. An organized family planning programme is only one aspect of national population policy. Rapid population changes create new social needs and problems and they place greater demands upon government to administer new programmes or modify old ones. This paper is concerned only with nationally organized family planning programmes, i.e., with those deliberate efforts by Governments to provide birth control services for use on a voluntary basis (individual freedom of choice based on education and knowledge) to a target population, to the end of lowered and/or controlled fertility (among other objectives, maternal health, child health, reduced resort to non-medically induced abortion, individual well-being, economic development and human rights).

3. Family planning, although an old social practice, was not publicly advocated until the late nineteenth century, and then only by private groups. A few countries introduced family planning programmes in the early 1950s. Within the past 10 years, it has been officially adopted in a number of countries. Over two thirds of the world population live in countries whose Governments support organized family planning programmes, although the regional differences in official acceptance vary greatly.[1]

4. Organized family planning requires a high level of user participation. Any successful family planning effort must be understood and accepted by the people and be based on public trust and confidence. It cannot be solely dictated or legislated. Family planning is such a multifaceted, personal and intimate subject that its practice can only occur on an individual voluntary basis.

5. Nationally organized family planning activities, at the current stage of birth-control technology, require an extraordinarily high level of organizational and administrative skill. Few other programmes need the same degree of intensity of public contact and interaction. Except for sterilization, the users of contraceptive and birth-control services must frequently interact with the "providers". In some situations, it may be almost on a monthly basis with the purchase or procurement of contraceptives at local outlet(s). In other situations, it may be for a longer period, from six to twelve months, with a visit to the intra-uterine device (IUD) clinic. While the technology of birth contraception and prevention leaves much to be desired, the technology, if properly used, is effective. It requires, in most instances, the establishment of a frequent and regularized pattern of interaction between the "providers" and the "users", which takes time to establish and requires a distinct programme identity and institutionalized social patterns.

6. A principal obstacle everywhere to the development of successful official family planning programmes lies in the area of organization and administration. Where there has been public indifference, it usually has been because of inadequate public educational efforts and poorly organized services. The challenge for planners and administrators is to work out effective means for delivery of this technology and service to the public. While considerable progress to that end has been made, much remains to be done in almost all countries. There is need to examine comparative experience and to apply the lessons learned.

Organizational and administrative dimensions of national family planning programmes

7. Increasingly, it is being recognized that unique sets of factors—cultural, demographic, socio-economic, concerning knowledge and technology, and organizational—force one to put aside preconceived notions of the way in which family planning programmes should be organized and administered in one region in contrast to another (see annex). What works well in Pakistan may not work well in Colombia and not at all in Morocco. Nevertheless, there are a number of well-understood dimensions of factors that affect the organization and administration of any national family planning programme. There are also basic and tested principles which are useful in assisting administrators

* Public Administration Division of the Department of Economic and Social Affairs.

[1] See Dorothy Nortman, *Population and Family Planning Programmes: A Factbook*, Reports on Population/Family Planning, No. 2, 4th ed. (New York, Population Council, 1972).

in planning, organizing, and administering their programme in a more effective manner.

Main factors affecting specific form of organization and administration

8 Basically, two kinds of factors affect the specific form of organization and administration of family planning programmes First, there are those which planners and administrators must accept as relatively inflexible (fixed, absolute or mandatory) in character Secondly, there are those which planners and administrators have the capacity to modify in varying degrees; but in day-to-day operations, these factors are just about as inflexible as the first kind. The former constitute largely organizational factors and the latter administrative factors, although there is not always a clear and precise differentiation

Organizational factors

9. Five basic organizational factors and/or requirements, which also, to some extent but not entirely so, function as constraints, have been singled out: (*a*) programme design must be related to the capacity to use available science and technology, (*b*) a high level of administrative-management specificity is required; (*c*) well-defined authority relationships are mandatory, (*d*) relationships of programme operations to stages of fertility change are inconclusive; and (*e*) programme must be based on voluntarism

Need to relate programme design to the capacity to use available science and technology

10 The capacity to use available science and technology in family planning varies substantially from country to country. Increasing this capacity in a country is often a difficult process and takes considerable time.[2] Each national family planning programme must be uniquely designed to fit its capacity to use available contraceptive science and technology, and, at the same time, to be sufficiently flexible to put into effect new scientific and technological developments which, in the foreseeable future, may become accessible. The adoption of new contraceptive technology, in most instances, will often involve changes in the administrative organization of the programme.

Need for high level of management specificity

11 [illegible] ally [illegible] tions [illegible] consistently suitable "packages" of complex services to a highly differentiated clientele who are influenced by a number of factors over which the administrators have little control. Family planning programmes are very much affected by changes in their operating environments and their programme usefulness depends upon quick response to differing situations and new social needs and demands Information is needed to enable family planning administrators to make timely organizational and programme changes

Well-defined authority relationships mandatory

12 Because of the personal and intimate nature of family planning and the large numbers of organizations and jurisdictions often involved in family planning programmes, authority (the administrative capacity to act) must be explicitly defined, widely understood and carefully applied

Relationship of programme operations to stages of fertility change inconclusive

13. The relationship of organized family planning programmes to change in fertility rates is insufficiently understood Birth control is only one of the means for reducing fertility rates Social patterns and discipline, such as postponed marriage, increased celibacy, and changed mortality rates also have their effects The theories concerning these and related reasons for fertility changes are weak and views of scholars conflict. Most of the family planning programmes have been in operation for too short a period to allow determination of their measurable impact on fertility rates. Nevertheless, the possibilities for examining and understanding the relationship between family planning efforts and rates of fertility change have greatly increased as a consequence of the steadily expanding number of national family planning programmes. Over 30 Governments have initiated national family planning programmes as a means to reduce the rate of national population growth The results will be known only after a period of a decade or so. In the meantime, there is need for patience and constant review.[3]

Programme based on user voluntarism

14. Family planning programmes demand an extraordinarily high level of "voluntarism", which over time, in most cases, evolves into a regularized pattern of contact between the users and the providers of contraceptive services This has proved to be a very difficult set of relationships to develop and maintain

15. In some countries, family planning programmes at first experienced marked success and had the appearance of widespread public acceptance. That success, however, was short-lived, as evidenced by a sharp "erosion of voluntarism". Such initial successes in birth-control programmes were illusory because those who were prepared to practice birth control readily volunteered Subsequent progress was much more difficult.

[2] *World Plan of Action for the Application of Science and Technology to Development* (United Nations publication, Sales No E 71 II.A 18), especially pp. 240-264

[3] [illegible]

Administrative factors

16. Three factors profoundly influence the basic administrative processes: (*a*) nature of the programme purpose(s); (*b*) extent of administrative integration and sectoral allocation of services; and (*c*) degree of consistency in amounts of resource inputs.

Nature of programme purposes

17. The purposes of a national family planning programme profoundly affect its basic organizational structure and its administrative practices. The purposes giving rise to organized family planning vary from country to country and may include some or all of the following: (*a*) the protection of the human rights of women in their childbearing years; (*b*) the protection of health, particularly of women and children; (*c*) the reduction of the incidence of clandestine and illegal abortion; (*d*) the alleviation of poverty and promotion of social welfare; and (*e*) the reduction of population growth.

Extent of administrative integration and sectoral allocation of services

18. Administration of family planning requires substantial programme integration at the higher levels while still permitting, at the same time, considerable operational flexibility at the local provider-user level. Satisfactory arrangements for meeting this administrative requirement have not been fully developed. This has been the case even in small, compact countries or areas, such as those of Singapore and Hong Kong, as well as where there has been only one organization, such as the health department, primarily responsible for the delivery of a simple package of family planning services.

19. Basic to this problem is the Government's policy as to the role and pattern of each sector in the country in the delivery of family planning and supporting services. In some countries, these services are placed primarily in the government sector; in others, in the voluntary associations, local authorities, and the private sector; and in still others, in a combination of these sectoral possibilities. As yet, there has not emerged a common pattern of relationships between these sectoral and multifunctional components that can serve as a guide for administrative design and action.

Degree of consistency in amounts of resource inputs

20. Resource inputs must be consistent with the highly regularized operational patterns required for family planning programmes. The need for sufficient financial resources at the right time has been one of the major operational constraints.

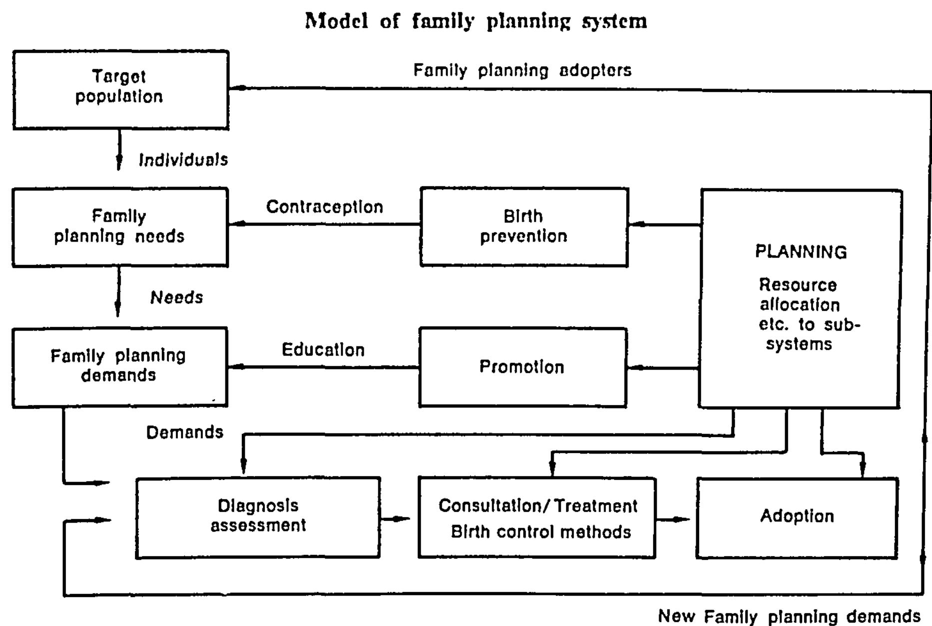
Bases for family planning programme design and analyses

21. The bases for family planning programme design and analyses are discussed under the following headings: (*a*) the systems analysis method; (*b*) organizational requirements for family planning programme effectiveness; (*c*) practical population family planning policy; and (*d*) administrative improvement and development programmes.

The systems analysis method

22. Family planning administration can probably best be understood and compared in systems terms. This involves conceptualization of family planning within a "holistic" framework, as shown in the figure given below. Too often, programmes in the past suffered from preoccupation with one or another particular element, component or approach and from attempts to secure "quick" results instead of building solid systems.

Model of family planning system



23. Family planning may be viewed as a complex system in which scarce resources are combined to achieve specific social goals The complexity of this process is indicated in the annex, which lists and classifies into five broad categories the principal factors or elements affecting the development of family planning programmes Administration is the principal process by which the elements of these five categories are harmoniously integrated to achieve the social goals of the family planning programme.

Organizational requirements for family planning programme effectiveness

24. Sound family planning programmes will include the following features: (*a*) a clear definition of policies, objectives, and functions; (*b*) adequate leadership and organizational arrangements for co-ordination, including performance standards for participating agencies, (*c*) justifiable allocation of resources to operational functions and units; (*d*) systematic method of operations through different levels of Governments and administration, (*e*) liaison arrangements with related governmental and non-governmental, national and international agencies; and (*f*) field units for delivering services and information to acceptors or users of contraceptive and other birth-prevention measures. To meet these requirements, a centre for planning and direction is necessary which provides a framework for administrative action and issues administrative guidelines for achieving programme goals.

Practical population/family planning policy

25. Population/family planning policy needs an explicit statement to make clear whether its objective is to facilitate family planning, to foster population control or both While family planning tries to make it possible for parents to have the number of children they want, population control attempts to modify the family's social environment so that parents will want fewer children. Both approaches are often necessary and interrelated; and, in the administration of family planning programmes, should be concurrently considered The question is basically one of timing programme modification in relation to changing social needs and the administrative capability of a country to meet them.

26. Thus, planners and administrators of national family planning must periodically seek an answer to the following multifaceted question in order to secure a sense of programme purpose and direction: whether their programme should include essentially, but not exclusively, measures of: (*a*) direct fertility control (birth prevention); (*b*) direct fertility and mortality (health or death) control; (*c*) direct social structural changes which affect fertility and mortality. The first two programmes treat essentially the social symptoms and the last the social causes of differing fertility and mortality rates.

27. Only after a realistic answer to this question is made may planners and administrators deal in constructive terms with the following basic but critical aspects of any national family planning effort: (*a*) develop a practical family planning policy; (*b*) design a viable organizational structure; and (*c*) initiate sound administrative practices for delivering a specific package of services to the people.

Administrative improvement and development programmes

28. The design and administration of family planning programmes must take into account: (*a*) current administrative infrastructure of the country; and (*b*) its administrative and development capabilities [4] Planning and development administration activities directly and indirectly affect the organization and administration of *sectoral and multifunctional programmes such as family* planning Successful family planning programmes are most frequently found in countries that also have effective public administration and development programmes

29 In a number of countries, the central planning agency performs a central role in allocating resources for sectoral and multifunctional programme development and provides a major organizational base for the development of effective family planning administration. The agency also serves as an administrative vehicle for canalizing external donor assistance and facilitating the establishment of communication with national and international bodies interested in family planning.

30 Problems of internal administrative-management found in family planning programmes, such as personnel, budgeting, accounting and supply, frequently cut across the entire government operation; and they can often only be effectively resolved within an organizational context much broader than a single operational programme such as family planning The base for strengthening family planning programmes is greatly enhanced in those countries which have in operation effective administrative-management improvement programmes, such as organization and methods and programme analysis and evaluation, and schools and institutes of administration and management.

Working relationships of the administrative components

An overview of the framework of analysis

31. National family planning programmes are analysed in this section within an administrative-management systems framework consisting of. (*a*) planning; (*b*) operations, and (*c*) programme evaluation.

32 Planning is at first concerned with whether there is a need or demand for the programme and, subsequently, with its extent and how it will be met by

[4] See *Appraising Administrative Capability for Development* (United Nations publication, Sales No E 69 II H.2)

policies, programmes and strategies. *Operations* relate to the implementation of programme activities, including its structural features (intraorganizational, inter-agency and intergovernmental relationships), co-ordination and areas of programme conflict, stress and tension. The major activities of the programme in the terms of organizational process, direction, control and supervision are included along with the inventory of programme resources and how they are organized and employed. Programme evaluation concerns mainly the assessment of programme activities and the measurement of programme outputs, effectiveness, efficiency and efficacy. This systems framework may help high-level policy-makers and administrators to: (*a*) have a comprehensive view of their programmes; (*b*) identify internal and external constraints which hamper their programmes' effectiveness; and (*c*) initiate corrective measures.

Programme planning

33. Four general categories are discussed: (*a*) need and demand for national family planning services; (*b*) nature and scope of programme policies; (*c*) character of programme goals and objectives; and (*d*) composition of programme plans, strategies and tactics.

Need and demand for the programme

34. As a family planning programme matures and develops, the needs that are formulated into demands must increasingly be a result of a collaborative process between the providers and the users of services. New forms of public participation in the administrative processes will be required which may lead to the use of new birth-prevention technologies, different administrative practices and expanded organization. These related facets must, in turn, be built into a long-term development plan.

Nature and scope of programme policies

35. Well-designed and articulated public policy is the "substance" or "gravity" which keeps the structural components and their elements integrated together and the programme moving towards fulfilling the society's "real" programme purposes. The policy formation and re-formation processes in most Governments are weak and have only recently begun to receive the attention they deserve.

36. A national population/family planning policy should clearly prescribe guidelines for administrative action, but should be sufficiently adaptable to permit a high degree of programme innovation at differing stages of programme development. Increased concern is being given to the "necessity of formulating population policies and programmes as integral parts of the social and economic development process".[5]

[5] First paragraph of the "Declaration of Population Strategy for Development", adopted at the Second Asian Population Conference.

37. Discussion on policy issues too frequently centres on the professed long-rang objectives. More analysis needs to be given to public policy as comprising essentially the laws, regulations and allocation of financial resources of a country over time. A more accurate description of the policies of a country is usually secured from its budget than any other source, as it often shows disparities between professed objectives and actual priorities.

Character of programme goals and objectives

38. Few aspects of family planning programmes are faced with so many problems as the determination of organizational goals and objectives. In administrative usage, goals are defined as objectives expressed in the terms of one or more specific dimensions, such as the quantity and quality of production, or costs per unit of output. Because family planning programmes are exceedingly complex, goal conflict among participating organizations is common and the definition of clear and precise goals is at times difficult. Further, there are many conceptual difficulties in formulating realistic programme goals. Goals are mixed products of value judgements as well as hard facts. There are goals of ends and goals of means or a peculiar combination of both, and within all these, a series of subgoals (purposes, objectives, targets, aims) may be found.

39. Through the introduction of new management methods and procedures and improved administrative evaluation, significant progress is being made in strengthening the administrative process for identifying and setting realistic goals.

Composition of programme plans, strategies and tactics

40. Much attention has been given to the importance of plans and planning in the development of family planning programmes. However, no aspect of administration of these programmes has proven to be so difficult. The framing of plans as administrative instruments for programme implementation and evaluation of family planning efforts has not progressed to the extent desired.

41. Because of the peculiar nature of family planning activities and services, modern practices of administrative programme planning can readily be applied. Realistic programme goals can be determined and a course or courses of action planned for their achievement. Broadly speaking, this will require the development of two basic types of plans, single-use plans and standing plans. Single-use plans lay out a course of action to fit a specific situation and are "used-up" when the goal is achieved, whereas standing plans are designed to be used over and over again. Once this kind of administrative planning is more extensively employed in family planning programmes, some of the implementation problems so often mentioned will be resolved.

Programme operations

42. In terms of programme operations, the structural elements of any family planning programme may

be analysed and appraised within three system-components or relationships [6] In broad terms, these relationships break down into the "means" and the "ways" by which family planning services are provided:

(*a*) The instrumental component consists of programme elements that directly relate to the target population. Included are. (i) kinds and extent of the birth-prevention technologies and measures; (ii) pattern and content of information/communication; and (iii) kind and extent of social support, especially as found in the local community or region;

(*b*) The direction/control component consists of programme elements that build, direct and co-ordinate the instrumental elements Included are. (i) nature and location of the centre of direction; (ii) quality and extent of top leadership, (iii) quality and extent of supervision; (iv) nature of programme operational rules; and (v) nature and quality of evaluation services,

(*c*) The support component consists of those elements which strengthen and sustain the direction/control component Included are: (i) kinds and quality of personnel, (ii) quality and extent of education/training; (iii) kind and amount of inputs, namely financial, over time, (iv) reliability in supply and distribution of contraceptives; and (v) quality and use of research

43 To analyse further programme operations, attention is given first to the ways—direction/control and social support components—and, secondly, to the means—instrumental component—by which family planning services are provided to the public

Elements of administrative direction/control

Centre of direction

44. In the system of public management of a country, including in some areas its large subdivisions which operate as semi-autonomous or autonomous units, a national programme of the complexity and importance of family planning requires that a centre of direction be established Whatever the form of the family planning programme, the centre should be set up as high as possible in the government administrative system and placed under an administrator who has clear-cut and adequate authority and responsibility to carry out public policy and who is held responsible to the duly constituted executive authority of the Government The exact location will depend upon the political and administrative circumstances in each country. It may be located in the Ministry of Health, as it is in many countries, in the Ministry of Planning, as in a few countries, or in the Ministry of Population and Employment, as in France The centre, to be effective, should be located at a sufficiently high level to make close consultation and co-ordination with other ministries and top agencies politically and administratively possible. It should be strategically located vis-à-vis the "cluster" of national planning financing and management improvement agencies so that the programme can receive the necessary policy and administrative support.

Top leadership

45. The importance of the quality of top leadership is becoming increasingly recognized. New and emerging [illegible]

leadership. What is often required, and particularly at the initial stages, is a person who is able to stimulate others to a high level of performance and is willing himself to try new approaches, especially to adapt the programme to differing and changing circumstances.

Supervision

46. In any organization, the development of effective supervision is one of the most difficult administrative tasks It is the people at the lowest levels of the organization who carry out the burden of performance. They are the "doers", the ones who get the job done The most difficult, and yet the most important, position in any organization is that of the line supervisor· the person who bridges the gap between the lowest level of management and the workers. In family planning, this is the point of actual delivery of the contraceptive and educational services to the public. The field staff must often become to some extent multipurpose workers in order to enhance their acceptability and efficiency when working with people Thus, there may exist a tendency for them to perform services and skills beyond their training capabilities and job assignments, which gives rise to problems of reporting to higher authority, expertise to carry out the specialized activities and related matters.

Operational rules and procedures

47 Because of the uniqueness and newness of national family planning, the legal base for the programme is still being developed New family planning programmes often raise legal questions which usually take considerable time to resolve For example, whether a wife can use contraceptive measures or secure an abortion without first securing consent of her husband; or whether family planning services can be provided to unmarried female teen-agers. Such problems have consequences for the formulation and application of suitable operational rules and procedures Furthermore, programmes have not been in operation long enough to develop their own unique sets of administrative operational rules and procedures. To initiate the effort quickly, administrators have often had to work within the existing governmental rules, regulations and procedures, which have often handicapped programme operations. This has invariably been the case in the areas of personnel and financial administration, a [illegible]icularly

[6] This conceptual framework, although modified substantially, is derived from an article by Moye W Freymann, "Organizational structure in family planning programs", in Bernard Berelson and others, *Family Planning and Population Programs A Review of World Development* (Chicago, University of Chicago Press, 1966), pp 321-334

those countries with a tradition of strong Ministries of Finance. The introduction of a financial incentive programme, for example, will require major changes in the financial procedures of most countries.

Evaluation

48. Evaluation as employed in family planning means many different things and serves many different purposes and interests. As a concept, it is not well developed, in spite of the great attention which it has received. Four basic types of evaluation are usually identified: (*a*) those for analysing programme development; (*b*) those for assessing administrative performance; (*c*) those for appraising clinic operations; and (*d*) those for assessing demographic situations. Increasingly, it is being recognized that these types of evaluation also represent differing aspects of the overall organization and administration of family planning programmes.

49. Sophisticated techniques and methodologies of administrative systems analysis are currently being employed to a greater extent to identify operational problems, seek solutions and remove administrative obstacles. As a consequence, new and improved management systems and practices are being developed in such areas as: (*a*) improving the flow of information to and from central and local authorities and offices; (*b*) designing systems for supply and storage of contraceptives; (*c*) determining the geographical location of field clinics and operations; (*d*) measuring motivational effects of mass media on target populations; (*e*) isolating operational costs of system components; and (*f*) establishing benefit/cost and cost-effectiveness of programme activities. The major weakness of evaluation is found in its broader area of programme or socio-economic assessment, a topic which is discussed below.

Elements of administrative support

50. The term "elements of administrative support" includes only those activities which feed into and sustain the control function.

Personnel

51. Considerable attention has been given to the staffing requirements of national family planning programmes. Manning tables have been developed which include personnel requirements from the highest to the lowest organizational levels. Increased consideration is being given to manpower capabilities in individual countries. Studies have been made as to the requisite manpower requirements to deliver a particular package of family planning services, for example, within a maternity and child care model. Only slight attention has been given to the unique personnel administration requirements of family planning programmes. Since family planning is a new social programme, this raises a number of personnel questions concerning such basic matters as: (*a*) recruitment; (*b*) testing and examination; (*c*) training; (*d*) promotion; (*e*) performance evaluation; (*f*) career patterns; and (*g*) fringe benefits. In some countries, family planning programmes have been hurriedly put together. Officers have been deputed to the programme from the established services and others recruited outside of the normal civil service procedures. This practice has caused personnel problems which have not been easily resolved, because of differences in salary and other benefits and related aspects. Since by far the largest single programme cost is for personnel, from 65 to 85 per cent or more, the importance of sound personnel administration is clearly evident and requires increased attention.

Training and education

52. Training and educational requirements for national family planning probably exceed those of any other government programme of the social type. The requirements must be analysed in both specific and broad categories, and they encompass a wide range of programme activities. In general, they should include two broad groups of persons: the operational staff, and the target population or clientele. There appears to have been a tendency on the parts of some officials and planners in operational positions to underestimate the ability of societies with high rates of illiteracy to understand, accept and use contraceptive measures, and to over-specify the educational qualifications and skill levels of persons needed to deliver at the field-level family planning services. The bulk of the family planning services in several countries with high illiteracy rates have been provided by field-workers with only 10 or so years of formal education and one year of training. Nevertheless, these programmes have been well accepted by the target populations.

53. Approaches and kinds of national educational services to be provided to target population family planning programmes are still in their formative stages. It is difficult to identify any common programmes and trends except with the possibility of greater emphasis being given to mass communication and education.[7]

54. Investments in educating and training family planning operational personnel have been sizable, but little study has been given to the relationship of various levels of technical and managerial skill and knowledge to programme "pay-offs". This aspect requires constant administrative review in order to prepare "key" people to meet new and different programme requirements. In some countries, educational and training programmes are confronted with human relations problems. Training as a concept and as a career process is not well understood.

55. United Nations surveys have repeatedly emphasized the need for administrative-management training, particularly in the areas of human relations,

[7] For more details, see United Nations Educational, Scientific and Cultural Organization, "Population and education", *Population Debate*, vol. I, part four; and *idem*, "Communication in support of population/family planning and development", *Population Debate*, vol. II, part eight.

supervisory practices and systems analysis This includes the training of new managers as well as the retraining of mid-career and technical personnel. The development of managerial talent is an exceedingly complex process, which is not fully understood. Nevertheless, over the past 25 years, considerable progress has been made. In almost every country, special training programmes have been initiated, professional training societies established, and schools and institutes of administration developed These new institutions can play a more important role in developing managerial talent and strengthening national administrative capabilities

Finance

56 The United Nations Fund for Population Activities (UNFPA) has estimated that it would be necessary for developing countries, if they are to carry out reasonably complete family planning programmes on a broad national basis, to spend $0 65 *per capita* per annum This figure increases to $1 00 if the costs of educational, motivational and evaluation activities are included. These costs, in relative terms, are not small when translated into their percentage of the national budget, which is about 5 per cent and is roughly equivalent to the current size of the national health budgets.[8]

57 More research, however, is needed on costs and benefits of family planning programmes These estimates are primarily based on the costs of establishing and administering a discrete and separate organizational system for delivering family planning services, with heavy emphasis on a model of field clinics This approach, in the short run, may be rather costly for a number of countries where it is not only necessary to build organizational infrastructure and carry out a major motivational campaign, but where related health services are unavailable also to establish a separate delivery system. Thus, in the initial stages of a pro- [illegible]

achieving low costs per acceptor. As family planning practices are adopted throughout target populations and programme services are institutionalized in diverse organizational systems (education, health, agricultural extension, welfare), the programme's operational cost per user should (in time) substantially decline. Family planning is a somewhat unique programme in that throughout its development process the need for a large, centralized and discrete organizational system becomes, over time, less important as its services are becoming institutionalized in the structure of government and society. This process will affect profoundly the organization of the programme and in turn its administration

58 In the area of financial administration, some of the most difficult problems of public administration arise The financial management aspects of family planning programmes are peculiarly complex and difficult. Nearly every conceivable planning, budgeting and accounting type of problem emerges because of the nature and complexity of the issues, e.g, centralized *versus* decentralized spending authority, charge for *versus* free services and conditional *versus* non-conditional grants-in-aid to voluntary bodies and local authorities

59. In spite of its importance and complexity, there is no evidence that systematic attention has been given to this problem High-level surveys emphasize the need for improved financial management procedures and operations, but this emphasis does not appear to have resulted in concrete studies or follow-up management improvement efforts.

Supply and distribution of contraceptives

60 Maintaining a reliable supply and distribution of contraceptive products has proved to be a difficult problem in many countries Steps needed to assure the widespread availability of current and prospective contraceptive devices include alternative administrative supply and delivery systems, setting of standards and testing procedures, administration of patents and licensing, maintenance of a clearing-house for production information and the provision for technical and financial assistance to local proc tion and distribution agencies. The advantages and disadvantages of private commercial concerns and channels for production and distribution of contraceptives require further investigation The role of public administration to facilitate this activity is crucial Its role both as a regulating authority and as a provider of direct services needs further examination

Research

61. In recent years, there has been literally a research "explosion". Family planning literature is expanding rapidly and is becoming more complex as more disciplines and countries become involved. This situation has given rise to a number of administrative problems. Country programmes must now make judicious but crucial choices as to the kind of research they should pursue. Some observers feel that research in the biomedical area should be conducted essentially by those countries which have advance research technology and can muster substantial resources Research in social and behavioural sciences, demography, administrative programming and management has to be given increased importance by all countries The relationship of the causal factors affecting changes in fertility has received considerable attention New knowledge and understanding in this area will have a direct bearing on national population policies and the organization and administration of country family planning programmes

[8] International Bank for Reconstruction and Development, *Population Planning, A Sector Working Paper* (Washington, D C, 1972), pp 22-24, and Bernard Berelson, "The present state of family planning programmes", *Studies in Family Planning*, No 57 (September 1970), and later numbers.

62. A major problem consists of appraising the usefulness of this burgeoning research and putting its findings into operational practice. This task will require new and unique management information systems and decision-making centres. United Nations studies have recommended the establishment of national multidisciplinary research centres and have concluded that considerable technical assistance will be required for this purpose. A "knotty" problem is the management of multidisciplinary research programmes, because of the large number and complex nature of the disciplines involved.

63. The data and information base for undertaking family planning research and analysis is weak. Major organizational and administrative improvements will be necessary on both the national and the international levels to correct this situation, although increasing emphasis is being given to strengthening national statistical agencies and the quality of data and information.

Elements of administrative instrumentation

64. The effectiveness of a family planning programme is determined by the variety and quality of its instrumental elements, the suitability of the mix to the local situation and the manner in which they are delivered. This comprises the technologies which may be employed (the birth-prevention devices and their methods) and the use of institutions and their influence, relationships, patterns and measures. In other words, the elements of instrumentation consist of the "means" and the "ways" in which they are put together in achieving family planning goals. A social institution may be just as instrumental in terms of results (for example, increased education or the employment of women) as a contraceptive device.

Services

65. A family planning programme that employs the full range of feasible birth-control devices and measures will have a much different organizational arrangement than one that relies on only one or several. A basic problem in organizational design is the matching of birth-control technology with the target population's education, skill, facilities and preferences. A simple continuum runs technology—administration—people. A government policy may call for use of a wide variety of birth-control technologies, but neither it nor the private sectors may have the delivery capability and the target population the absorptive capacity for such a full range of services.

66. Successful family planning efforts invariably have employed several birth-control technologies and institutional measures. A few countries at first placed primary emphasis upon only one technology (usually the IUD) delivered by one institutional network (usually the national health service), which did not meet with much success. Experience shows that a variety of technologies and suitable institutional delivery systems is required to meet social preferences, health needs and policy objectives.

Information/communication

67. These two items are treated together, although in a family planning programme they could comprise separate subjects. Communication is one area in which considerable success has been achieved. Nevertheless, major gaps exist. The use of mass media and other forms of communication is often ineffective and far from being fully utilized. The knowledge and use of communication channels, especially traditional ones, requires further investigation. There is a need to sharpen techniques for information use in the countries with culturally heterogeneous populations, especially those where literacy is low and mass communication facilities are limited.[9]

Social support

68. Family planning programmes represent a virtually unprecedented attempt at deliberate social change of very great magnitude. The points of opposition to change are also the ones of potential social support: political organizations; bureaucracies; religious hierarchies; *élite* groups; traditional cultural bearers; and new emerging business and urban elements. The knowledge and the capacity of mobilizing social support for family planning remain possibly the least developed of all the organization and administration facets. Community interest groups and relevant social organizations in many countries have scarcely been investigated. Only few studies have been made on the instrumental aspects of social institutions in family planning.

Programme evaluation

69. The methods of evaluating national family planning within programme terms are not very well developed. Programme evaluation has received a great deal of attention, but the methodologies remain unsatisfactory and the results inconclusive. This situation is due to a variety of reasons, not all of which are technical and methodological, and most of them are not unique to family planning. The basic problem is that programme evaluation serves several, if not many, purposes and interests, and suitable administrative arrangements have not been developed for their constructive resolution.

70. A planner in a central planning agency views a family planning programme much differently than its top administrator. The planner is constantly trying to maximize public expenditures and usually in terms of economic efficiency, e.g., whether the "pay-off" in family planning is as great as that in agriculture. A responsible top administrator is primarily interested in only his programme: finding enough resources to get

[9] For more details, see United Nations Educational, Scientific and Cultural Organization, "Communication in support of population/family planning and development", *Population Debate*, vol. II, part eight.

the job done in an efficient and economic manner. As a consequence, a widening gap exists between the planners and the administrators of public programmes.

71. Evaluation of public investment in social programmes is very difficult and especially so in family planning programmes, since their objective is essentially that of preventing some things from happening (e g., unexpected pregnancy and, in some cases, unwanted birth), and it is extremely difficult to ascertain, measure and cost these social events.

72. Another concern has been the comparative evaluation of performance between programmes administered by public organizations and by voluntary associations. This exercise has often been futile because of substantial differences in the purposes and services between the public and the voluntary programmes and the nature and extent of their services rendered to target populations. Frequently, the public family planning programme delivers a complex package of health and birth contraceptive services, whereas the voluntary association delivers only contraceptive services. Comparative evaluation of these two different kinds of packages of services is extremely difficult, although it is one that family planning planners and administrators must often face.

73. The measurement and evaluation of programme success against some predetermined performance goals have also proved difficult. Success is frequently as much a product of favourable external factors over which administrators have no or only slight control (geographical boundaries, legal, economic, political, psychological, physiological, demographic) as of internal factors over which they may have substantial control. As yet, there has never been developed a satisfactory framework for differentiating between the effects of external and internal factors on programme performance.

74. With increasing attention being given to internal constraints and factors and their effects on programme operations (policies, goals and objectives, resources, activities, organization, information), steady progress is being made in improving the quality of internal evaluation of planning programmes. Internal evaluation is being emphasized as a continuous process and designed to provide administrators with a practical "tool" for assessing their programme performance, identifying strengths and weaknesses, and defining measures to effect needed changes. Progress in this area will undoubtedly set the stage for assessment and evaluation in the larger programme area

Conclusions and action proposals

75 The purposes, type and extent of national family planning programmes required in each country will vary widely, depending particularly upon their demographic situations, national objectives, economic and social development and administrative system and capability. A major requirement for the successful formulation and implementation of family planning programmes in all cases is the availability of requisite organizational and administrative capabilities Governments interested in providing family planning services to large target populations will have to give increased attention to this problem (see paras 5-6)

Problem areas

76. Major problem areas requiring attention in the organization and administration of national family planning programmes are discussed below.

Organizational arrangements for policy development and co-ordination

77. There is need to establish and to maintain the vitality of organizational arrangements at the highest level for the formulation and co-ordination of population and family planning policies in order to guide national efforts in these fields and to ensure their compatibility with other national policies and programmes. In view of the far-reaching implications of population trends and policies for national development, the goals and objectives as well as the action programmes in the population and national development fields need close co-ordination (see paras. 17-19 and 24-27)

Programme planning, operations and evaluation

78 The participation in family planning activities by a large number of organizations and levels of government and, to varying degrees, non-governmental voluntary and commercial agencies calls for a clear locus of responsibility for comprehensive programme planning, specification of operations, setting of standards and establishment of review and evaluation procedures. A strategic element in the success of national family planning programmes may be the ability of administrators to foster interorganizational networks and to achieve co-ordination in their activities in pursuit of national policy goals (see paras. 31, 33 and 42)

Delivery systems

79. The organization of delivery systems for family planning services requires systematic analysis and constant review to maintain their effectiveness. Among the pertinent questions meriting study are: (*a*) the organizational and administrative requisites for different types of delivery systems based on use of different technologies; and (*b*) the cost-effectiveness of different packages of services as well as technology "mixes" in different types of circumstances (see paras 63-67).

Use of modern management techniques

80 The effectiveness of national family planning and population programmes can be increased through the sound use of modern management techniques. The application of systems analysis, for example, will more precisely identify organizational and administrative problems, missing components and co-ordination needs Management information systems, PERT and network techniques, used judiciously, have considerable potential for enhancing programme effectiveness National

and international institutions concerned with management training and development programmes can play a major role in the training of family planning personnel in the application of these techniques (see paras. 22-23 and 48-49).

Personnel administration

81. The most serious administrative problems in national family planning efforts are found in the personnel area. Finding capable technical and managerial personnel and training, motivating and keeping them in the programme are especially difficult tasks. Action-oriented surveys are required to define precisely the problems and needs in personnel administration, including: (*a*) estimation and long-range projection of personnel requirements and training needs to staff programmes; (*b*) adaptation of the personnel system to attract the requisite personnel; and (*c*) development of guides for recruitment and training of persons to staff management and supervisory positions throughout the family planning programme (see paras. 51-54).

Financial administration

82. National family planning programmes have unique financial administration requirements, since their task is to deliver a variety of complex packages of services and contraceptive products directly to target populations through various channels. Systems of accounting, budgeting and auditing designed to support management processes of complex national family planning require further study. Guidelines need to be developed in such problem areas of financial systems design as: (*a*) managing economic incentive programmes; (*b*) charging for and distributing contraceptive services and products; (*c*) decentralizing financial authority to the lower organizational levels to provide needed flexibility in programme mix and speed of action; and (*d*) developing financial data and information to support programme planning, operations and evaluation (see paras. 55-58).

Programme performance

83. Intensive study is necessary to identify those factors affecting high level programme performance which the administrator can affect. The development of realistic performance standards and methods for measuring performance in various activities and at various levels should be encouraged. Criteria for appraisal are especially meaningful when inputs are directly related to outputs. In some countries increased attention may be necessary to strengthen the data bases (collection, compilation, and reporting) required to provide the "feedback" information that planners and administrators need to keep programmes dynamic and effective. (See paragraphs 59-60, 62-67 and 65-70.)

Adaptation of national family planning administration to new knowledge and technology

84. The knowledge and technology bases for family planning programmes are rapidly expanding. Attention should be given to methods of assessing immediate and potential impacts of rapidly changing knowledge and technology on the administration of family planning programmes. The latter should be so designed that it can readily adapt and put to use new knowledge and technologies. (See paragraphs 10-56 and 60-62.)

Proposals for international support of national action

85. National efforts to establish and strengthen family planning programmes should be supported through international and regional action-oriented research, training and advisory services and other technical co-operation activities on administrative and management aspects of such programmes. The following are illustrative of the activities that would be especially helpful to Governments:

(a) *Organizational arrangements.* Development of guidelines on alternative arrangements for organization and administration of family planning and other population programmes under different circumstances and programme objectives;

(b) *Performance standards.* Development of guidelines for establishing national performance standards and measurement methods under alternative forms of organization and delivery systems;

(c) *Modern management methods.* Formulation of guides for use of modern management techniques, including management information systems, PERT and other administrative technologies in the administration of family planning programmes;

(d) *Manpower projections and training needs.* Development of methods for estimating and projecting manpower and training needs in family planning and other population programmes;

(e) *Training materials and training of trainers.* Preparation of materials for the training of managerial and supervisory personnel in family planning programmes and conduct of courses for the training of trainers in this field;

(f) *Seminars for senior personnel.* Conduct of seminars for senior administrators and those engaged in administrative planning on population dynamics and their impact on governmental services;

(g) *Organization and management specialists.* Inclusion of organization and management specialists in technical co-operation projects in family planning and related population fields and encouragement of co-operation between technical co-operation projects in public administration and those in family planning and other population activities at the national level.

86. The type of activities suggested above can be carried out through existing organizations in the United Nations system and through use of regional and sub-regional public administration institutions that are receiving assistance from the United Nations Development Programme. These institutions can play a particularly meaningful role by developing training guidelines and prototype management development courses for use

by national institutions and agencies It is urged that the network of intergovernmental and non-governmental organizations for the improvement of public administration develop the capability to support national efforts to improve the administration of family planning programmes

ANNEX

Factors affecting the organization and development of family planning programmes

Physical input factors

1. Non-human physical inputs·
   (*a*) Birth control devices and technologies
   (*b*) Facilities and structures
   (*c*) Vehicles and transportation means (animals, jeeps etc.)
   (*d*) Tools and equipment
   (*e*) Fuel and power other than human
2 Human physical inputs
   (*a*) Professional labour
   (*b*) Semi-professional skilled labour
   (*c*) Non-professional skilled labour

Economic factors

1. "Out-reach" processes which bring together at specific transaction points the "providers" and the "users" of family planning services on a regular basis
2 Facilities and processes for the supply and distribution of inputs, including employment programmes, credit, finance etc
3. Input prices, including interest and discount rates
4. Product prices, including the estimated cost of prevented births, individual and community health, new social advantages and freedom
5 Taxes, subsidies and related economic measures—incentives and disincentives

Organizational factors

1. Social/family institutional patterns—nuclear to extended etc
2 Political system as a basis for decision making
3. General government structure, services and policies for.
   (*a*) Co-ordinating diverse health, welfare and related input use
   (*b*) Health, welfare, education and social services—private and government health clinics, rural health clinics, co-operative health programmes, family planning associations
   (*c*) Local government and authorities—including in some cases highly deconcentrated/decentralized government operations
   (*d*) Diffusion of knowledge, i e, adult education classes, women's and youth clubs etc
4 Voluntary organizations—civic, welfare, health, family planning etc.
5 Business and industrial organizations, with a reaching market centre

Cultural and motivational factors (essentially demand factors)

1 Integration of family planning institutional organization, practices and values within the culture and society of the country
2 Public administration factors, structure, values, mode of operation of the bureaucracy—receptivity to family planning values etc
3 Social structures, cultural values, and psychological propensity (achievement levels) etc.
4 Processes of socio-cultural change, barriers and motivation in the innovative sequences, functional harmony or disharmony in society as its constituent parts change; included are the political values and capacity to resolve social conflict and articulate new social goals and programmes
5 Felt needs for family planning—by clientele, geographical area, population characteristics etc

Knowledge factors

1 Organization of basic and applied research—general and particular/population and family planning
2 Diffusion of relevant knowledge, such as:
   (*a*) Technical knowledge of birth prevention to. (i) "users" and (ii) "providers"
   (*b*) Economic and social knowledge, i e., improved health practices, family management, cost of child-rearing, educational expenses, alternative female employment opportunities
   (*c*) Policy, i e, national development, population, politics, public administration, planning
   (*d*) General education, i e, literacy, elementary and adult education, mass communication

THE MANAGEMENT PROBLEM IN NATIONAL FAMILY PLANNING PROGRAMMES

World Bank

1. The world is still in the early stages of developing official family planning programmes. It has taken decades of private pioneering and public discussion to reach the point where many Governments have now become convinced that family planning programmes are needed to improve the economic and social welfare of their populations. Within another decade or two, perhaps half the Governments of the world will be offering family planning services as a routine public service designed to influence the size and growth of the populations. Many of these Governments will also be experimenting with adjustments in the structure of social rules and incentives to lower fertility. The current period (i.e., the decades of the 1960s and the 1970s) is therefore a watershed in which a major new government function is being recognized and new structures and programmes are being established to carry it out.

2. This paper focuses on the problem of management in national family planning programmes. The first section reviews what is meant by "the management problem"; the second summarizes the various ways in which the World Bank has tried to deal with the problem in six specific projects. A brief conclusion points to where responsibility for the management problem ultimately lies.

Management and the evaluation of its performance

Definition of management

3. Many things must happen in order to establish new national family planning structures and programmes. Political leadership (which need not be visible or vocal) is obviously a prerequisite of a government decision to move into this new field of activity. Once the key political decisions have been made, policies must be articulated which provide guidance to those charged with working out enabling laws and decrees, organizational structures and staffing levels and budgets. A key factor in devising these new systems and getting them into motion is "management", a somewhat vague and elastic term that can explain everything or nothing.

4. In a strict sense, the management of national population or family planning agencies should be defined as the small group of people that includes only the chief executive and his senior associates. The number is never more than 10-12 people and is more commonly three or four, among whom the chief executive is always the key figure. These people are the key decision-makers and morale-builders upon whom nearly everything else depends. Management, of course, is not autonomous. It must operate within the broad terms of reference set by law and top political instructions. However, almost all the important initiatives that occur, or fail to occur, in a programme reflect the energy and wisdom of this small central group. Good management makes the structure operate effectively and deserves credit when this happens; bad management often underlies poor performance and ought to be replaced. In practice, it is rarely easy to judge whether systems are working well or poorly and hence to say how well management is performing its job.

5. It is too much to claim that good management alone makes all the difference. In arriving at judgements on the quality of management in any industry one must be careful not to give management credit or blame for results that may be determined as much by environmental considerations as by actions within management control. All one can say is that it is management which determines how much an organization makes of its opportunities. Thus, management is always important, but it may not always be the critical variable in determining system performance. There are many industries where non-management problems are typically critical to industry performance—e.g., research and development activities in the pharmaceutical or electronics industries, the pressure of technological change in air transport, natural risks in mining, the heavy capital requirements of the steel and chemical fertilizer industries, or labour and trade union problems in coal-mining and port operations. In the family planning "industry", however, management is invariably a key problem and is usually the principal cause of programme success or failure. It is true, as a prominent leader in the field once remarked, that "good management is no substitute for a sound strategy". However, since strategies are made by managements, good management is a Government's best assurance of a sound strategy.

6. The definition of "management" given in paragraph 4 is narrower than the full set of problems that are the concern of this paper. Use is made of the elasticity of the term to include within "management" not only the personal qualities of the top administrators, but the organizational arrangements and the procedures through which management exercices its directing and controlling functions. By "organizational arrangements"

is meant both the position of the family planning organization within the general structure of government, as well as its internal organization into departments, divisions and sections By "procedures" is meant the routine activities which govern the operation, analysis and control of the organizational functioning, e g., the budgeting and accounting system, procurement arrangements and the system for collecting and organizing data to measure the performance of the family planning programme (sometimes referred to as the management-information-and-evaluation system (MIES)) Thus, the term "management" is used to refer loosely to the means through which family planning programmes are carried out and controlled. Excluded by this definition [illegible]

agement's problems, but with the problem of management; not with problems that must be dealt with, but the means for dealing with them

Rise of interest in management problems associated with family planning

7. In the rapid development of population policies and institutions during the past decade, the top priority has been to get new organizations established and functioning or to carry through the rapid scaling-up of activities already being conducted, primarily by the private voluntary associations Since about 1970, however, a new concern for the management factor in family planning has begun to be heard.

8 One of the earliest international meetings to consider this subject was the Workshop on the Administrative Aspects of Family Planning Programmes in Asia[1] organized by the United Nations Economic Commission for Asia and the Far East (ECAFE) and the United Nations Development Programme (UNDP), with technical assistance from the Population Council, and held at Bangkok in 1966 In 1970, the Population Council launched two modest experimental projects on family planning management by contracting out to the Institute of Public Administration in New York the task of reviewing family planning administration in nine developing countries. The Population Conferences held at Bellagio, Italy, in 1969 and 1971 both included organization and administration on their agendas. At the 1971 meeting, the United Nations Fund for Population Activities (UNFPA) submitted a broad 10-page review of the state of organization and administration of family planning programmes around the world The UNFPA also proposed an ambitious series of studies, costing nearly $6 million and extending over five years, which would try to get at the determinants of programme effectiveness and efficiency by "studying organization and administration of family planning programmes" and which would include the development of a "training programme in management techniques for family planning administrators". (No action was taken on this proposal by the conferees.)

9 In 1971, the Ford Foundation began a somewhat more ambitious effort to inventory the management problems of both private and public family planning organizations in a number of developing countries in Latin America and in Asia. (The Ford Foundation assistance in Latin America was directed almost exclusively to helping the voluntary associations which have recently undergone very rapid expansion and which, in some countries, are being integrated into new government programmes) In June 1972, the Ford Foundation organized a conference on the management problems of family planning programmes which assembled at Elsinore, Denmark, all Ford Foundation field representatives plus a small number of invited guests [2] The ECAFE has continued its earlier interest in management problems by sponsoring a series of country studies, which one hopes will shortly be published. In 1972, UNFPA held a workshop in the United States of America on population programme administration, which was attended by representatives from nearly 20 developing countries [3] The World Bank, which first began lending for population projects in 1970, has put organizational and managerial problems near the top of its concerns when it appraises project applications Lastly, a growing interest in management problems is being shown by many government leaders in developing countries

Efficiency not first aim of management

10. It should not be assumed that there is complete agreement on what the aims of good management should be or that these aims should be constant over a period of time. At the Conference at Elsinore in 1972, the senior Ford Foundation officer present expressed his view that at the current stage of programme development in most countries "effectiveness is more important than efficiency" By this he meant that it was more important to judge programmes and their managements by the success achieved in gaining and keeping acceptors than by their success in achieving low costs per acceptor Governments and managements that worry about costs before learning how to recruit large numbers of acceptors are "penny wise, pound foolish". Concern for efficiency (or the input-output relationship between costs and effectiveness) should be secondary for a few years until the scale of organization and the order of magnitude of programme costs needed to achieve desired results become known. Only then will

[1] See *Administrative Aspects of Family Planning Programmes*, Asian Population Studies Series, No 1 (United Nations publication, Sales No E 66 II F 10)

[2] Selected papers prepared for the conference were subsequently published under the title *Readings on Family Planning and Population Program Management*. (Available without charge from the Ford Foundation, 320 East 43rd St, New York, N Y.)

[3] *Population Programme Administration A Summary of Shared Experience*, report of an International Workshop, July 1972, sponsored by the United Nations Fund Populati Activities and the Carolina Population Ce Dep ment of Health Administration, Chapel H rol

it become appropriate to think of "fine-tuning" the system by worrying about cost-effectiveness questions. If "efficiency-mindedness" (usually injected by external donors or academics) gains too strong a hearing at too early a stage, action and experimentation will probably be inhibited.

11. The priority of results over costs in the early years of a programme carries an implication about the type of people who should be placed in charge at this stage. They should be *entrepreneurs* first and trained managers second. There is a world of difference between the two. The qualities of the *entrepreneur*—raw energy, imagination, drive and the ability to overcome bureaucratic obstacles without forfeiting credibility—are far more important than the kind of technical knowledge about sound operating procedures and methods and the concern for comparing costs and results that are the hallmarks of the professional manager. Ideally, one hopes that a new family planning programme could combine entrepreneurial and managerial talents in the top management group—and indeed they will always be present in some proportions. The only question is which set of managerial qualities dominates, sets the pace and defines management's "style".

Judging performance

12. The top administrators of family planning programmes need to know how well their programme is going and people outside the organization need to have some basis for appraising management's effectiveness. The tests used are essentially the same. During the earliest years of a programme (the first one or two years), relatively little weight should be given to quantitative measures of "output" (i.e., acceptors, continuation rates or couple-years of protection). The top priority in the early period is setting up the organization, framing a programme and setting things in motion. The most important quantitative measures at this stage would be measures of inputs, such as progress in filling authorized positions, success in getting the supply pipeline filled, increasing the number of clinics at which services are made available and the numbers of training sessions held and of people who have attended. A top manager with a good sense of public relations, one who wishes to build local and external support for his programme, will prepare periodic reports on these matters if he is reasonably proud of what he has been able to accomplish. Although input data will be more indicative of performance during the initial period, output data must be collected and published from the beginning.

13. Any family planning programme needs a set of well designed, regularly collected and regularly published service statistics. These statistics provide initial indications of results achieved. They should show the numbers of new and continuing acceptors, by methods used, the locations and types of service units used etc.[4] Statistics of acceptors recorded in government clinics will need to be supplemented by statistics of participation in the private sector; such private services are usually composed of services dispensed through the clinics of voluntary associations plus supplies bought from pharmacies or other retail outlets. (Voluntary agencies are normally incorporated within the Government's own statistical reporting system, while the sales of contraceptives through retail outlets can only be reported regularly if the Government has a trade monopoly; otherwise, occasional sample surveys must be relied on or inferences drawn from import statistics.)

14. A programme without easily available (normally published) service statistics is almost never a well-managed programme. Four of the nine countries which have borrowed money from the Bank Group for population projects did not have such statistics when the loans were made. It is part of the task of institution-building to assist managements to overcome such short-comings.

15. It does not follow, of course, that a programme is well managed simply because it is able to publish service statistics, even if their quality is reasonably good. What counts is the trend of figures over time. Such figures tend to follow a fairly typical pattern, i.e., a rapid build-up of acceptors in the first few years as the programme at first makes services available to those who are already motivated, followed by a plateau as the programme faces the problems of educating, motivating and servicing groups who may know nothing of modern means of fertility control and whose (rural) lives may be governed by traditional value-systems that put a high value on large families. There may be several reasons why a programme is unable to push the acceptor rate beyond 8-12 per cent of eligible couples—the range at which the plateau phenomenon usually appears. Government policy may be weak, socio-economic conditions may make progress unusually difficult or management may simply not be very effective in mounting the programme extensions and innovations necessary to keep the trend-line on an upward path. Fair judgements on programme and managerial performance require detailed knowledge of local circumstances and people. The same need to go behind routing statistics is true of judgements of industrial or other types of revenue-producing activities, where the apparent simplicity and objectivity of financial reports is frequently misleading. The service statistics of a family planning programme show nearly as much about programme performance as do the financial statements of commercial enterprises. Thus, when read with knowledge and care, they deserve to be taken seriously as a first approximation measure

[4] There is considerable room for judgement as to what statistics a family planning programme ought to include. Several organizations have published recommended statistical programmes; three of the best known are those of the Population Council, of the Center for Research on Human Reproduction at Columbia University (largely the work of Samuel Wishik and Jack Reynolds); and of Donald Bogue, who directs the Communications Workshop at the University of Chicago. The International Planned Parenthood Federation (IPPF) in London has distributed suggested statistical forms to its many private affiliates.

of performance, though they always need to be supplemented by more subjective evidence and by special surveys. The most important subjective information is first-hand impressions of the energy, imagination and authority of a programme's top management group; the most important survey data are trends in age-specific fertility among acceptors and non-acceptors. National and external observers frequently make such qualitative judgements Unfortunately, trends in age-specific fertility are rarely available and are almost never in a form that allow them to be linked to family planning activities

Measures of efficiency

16. Everything said so far measures performance by an "effectiveness" standard, without regard to costs. To measure "efficiency" requires a comparison of inputs and outputs. Such measures can be constructed from either a cost/benefit or a cost/effectiveness perspective The former assumes an ability to put economic values on births averted; the latter does not attempt to derive such values and uses number of births averted or some other non-monetary measure of programme output, e.g, acceptors or couple-years of protection. Cost/effectiveness tests provide clearer measures of efficiency than cost/benefit or rate-of-return tests because they avoid use of benefit estimates, which are not closely dependent upon the efficiency with which resources are being used. If the value of an averted birth is high, this could give high benefit/cost ratios even to inefficient, high-cost programmes.

17 Benefit/cost tests are more appropriate as one means of justifying population projects in comparison with other sectors than for measuring the efficiency of a project or of management. The World Bank, building on work begun by others, has done enough work on the measurement of costs and benefits of population projects to be convinced that this use of resources is highly profitable to a country. A simple sensitivity analysis shows that such projects remain very attractive, compared with other development projects, even if the values actually realized are below reasonable expectations Nevertheless, the Bank does not report cost/benefit measures in most of its own project reports, mainly because it recognizes that questions of methodology will distract attention from the economic and social attractiveness of population projects in most countries. To convince people that particular population projects are economically attractive, the Bank relies primarily on the fact that population projects offer countries a much cheaper way of increasing *per capita* incomes than any other form of expenditure (this is, of course, a cost/effectiveness rather than a rate-of-return approach). This approach provides a very crude, though telling, form of project justification.

18 For purposes of programme supervision and control, management will be much more interested in cost/effectiveness measures which state the cost of adding one new acceptor or of providing one couple-year of protection. The Population Council and, more recently, the International Planned Parenthood Federation (IPPF), have both made important contributions to the establishment of initial cost standards. The Bank expects some of its borrowers to generate cost/effectiveness data in the course of carrying out some of its projects, but the projects being assisted are at too early a stage of establishment to yield useful data yet. There is no question that every well-run programme must eventually become concerned with the cost at which results are being achieved This will require careful handling of cost and output data if results are to mean much. On the cost side, there are many joint costs involved, on the side of results, "new acceptors" mean little unless one knows something about drop-out rates and, ultimately, about the number of births averted

19. It is worth noting that the foregoing discussion of efficiency and cost/effectiveness and cost/benefit (profitability) tests apply equally to any other sector of an economy, i e, they do not reflect any particular characteristics of family planning programme

World Bank experience

20. The World Bank puts great emphasis on helping its borrowers establish effective organizations to run national family planning programmes. The Bank's distinctive mode of giving assistance—the project—is the vehicle used by the Bank to secure this objective Three principal steps are involved The first step involves first-hand analysis of the organization and management problems in the borrower's family planning agency This analysis always involves one or more field missions, each lasting about four weeks. Such field missions (which invariably involve consultations with any other external donors with knowledge of the borrower's programme) lead to the identification of key problems and, eventually, to the proposal for needed actions. The second step involves building into the projects certain organizational arrangements and programme activities which the Bank and the borrower agree are necessary and feasible. The third step involves persistent follow-up of the projects, over periods of from three to six years, to do whatever is possible to ensure project success The Bank uses—perhaps unwisely—the term "loan supervision" to describe these activities Such activities include, for example, helping the borrowers to establish agreed accounting, reporting and control procedures; working out reasonable changes in project details, on request, assisting the borrower to recruit technical assistance, and seeing that specific agreements reached during negotiations are in fact carried out. On occasion, specific institution-building or management improvement changes are made conditions of a loan, i e, the borrower agrees to carry them out before he is entitled to draw down the loan. The characteristic Bank/borrower relationship after loan signing is one of assisting the borrower in overcoming [illegible] not of policing the letter of the legal [illegible]

supervision or follow-up is extremely costly to the Bank in time and money, but it has high priority in the work of Bank staff to assure realization of project objectives.

21. There now follows a review of six of the World Bank's population projects to identify some of the institution-building provisions that have been used to try to strengthen management (the projects are taken up chronologically). Some of the arrangements have worked well; others have worked not so well and were it possible to do the project over again, some things would probably have been done differently.

Jamaica

22. The project in Jamaica was the first project of the World Bank in the field of population activities. Before agreeing to proceed, the Bank persuaded the Government that an effective National Family Planning Board (NFPB) would need a firmer, clearer legislative charter. The Government was urged to consider three main organizational points which the Bank felt would be important for subsequent managerial effectiveness:

(*a*) A new statute was needed giving the national family planning programme a clear, permanent legal foundation and describing the new agency's authority over a specific list of functions;

(*b*) The size and membership of the new National Family Planning (advisory) Board should assure a sufficiently wide and balanced set of interests to achieve understanding and support for the (executive) Board's work;

(*c*) The national family planning executive agency should be headed by a person whose principal qualification was that of an effective administrator; whether he was a medical doctor should be a distinctly secondary consideration. Furthermore, the chief executive should be given enough independence of his Board to allow him to build a strong management team and effectively to control his staff.

23. The Government agreed with these points and they were incorporated in the new statute. Passage of the statute and appointment of the Board and of the chief executive officer had to be accomplished before the Government was entitled to draw money under the loan. The loan agreement itself committed the National Family Planning Board to do three things which it was hoped would eventually improve the effectiveness of family planning services:

(*a*) The Board committed itself to do two "management studies". The first was a study of the utilization of the 35-40 family planning clinics in the Kingston metropolitan area. The second study outlined the distribution of family planning functions among the various medical and paramedical occupations involved in providing service in the programme. The aim was to identify possibilities for allocating to less highly trained people certain tasks in a system where a heavy "brain-drain" has made medical doctors and nurses scarce. Both of these studies were directed by the same person, a Jamaican medical doctor attached to the University of the West Indies;

(*b*) The second explicit management component was a provision that within one year NFPB would engage the services of a full-time training director, either expatriate or local (a local director has now been engaged);

(*c*) Thirdly, a provision was agreed that during each of the three years of the project execution period, the entire national programme would be reviewed by a three-man team of expatriate experts appointed by the Government. This provides a degree of "public accountability", which it is hoped will be constructive and healthy and which should assist the Board in identifying areas needing special attention during the next year or two. Knowledge that this "friendly external pressure" is inevitable should cause programme management to perform a little better.

Tunisia

24. The second World Bank project, that in Tunisia, involved more intensive concern for management problems than in the case of Jamaica. Improved management practices were needed over a broad range of functions. The best way of getting control over these functions within a reasonable time appeared to be through the services of a management consulting firm. Terms of reference for a management study were agreed upon with the borrower (the cost of the study was about 3 per cent of the total project cost). After acceptance of their recommendations by the Government, the consultants were to assist the Government in implementing the new systems. A French firm was subsequently engaged, and the Government is now in process of implementing the firm's main recommendations, which have been broadly accepted.

25. One important management problem in Tunisia was completely unforeseen. It arose from a problem faced by many new family planning agencies. Such agencies always have the delicate problem of trying to attract good men to agencies that are new and untested. Men of the calibre needed almost always have good posts somewhere else in the Government. To recruit them to new family planning agencies frequently requires giving the agency a position of privilege with respect to pay and perquisites, at least for senior professional staff. Every Government has a few such islands of preference, which necessarily involve delicate problems. In Tunisia, the family planning organization was originally given a privileged salary structure, which allowed it to build up a promising staff. Because this arrangement caused difficulties in the agency's relations with the Ministry of Health, the Government suddenly withdrew the advantages enjoyed by the family planning agency and brought its salary structure in line with that of the Ministry. As a result, nearly a third of the family planning headquarters staff resigned within the next five months and the programme slowed to a walk. Because of the relationship established by the loan agreement,

the Bank was able to help the Government overcome this problem in a way that seems to have restored the ability of the population agency to recruit and hold good management and senior staff.

Indonesia

26 The project in Indonesia is the largest project to date of the World Bank. It is a $32 million, five-year project which is being financed jointly by the Bank's soft-loan affiliate, the International Development Association (IDA) and UNFPA. The project includes a wide range of "software" activities and "hardware" facilities, concentrated at Jakarta, in East Java and in Bali. It would have been unthinkable to organize and carry out a programme of this size and complexity without paying a great deal of attention to management questions (Indonesia is still in the fairly early stages of building up a strong public administration) The development of the project permitted the Government to work out, with intense Bank and UNFPA involvement, the basic structure of an expanded national family planning organization. The solution adopted was to create an agency entirely outside the Ministry of Health This agency was given planning, programming, financial and evaluation control over all family planning activities. It was not, however, given responsibility for programme execution, which was left to the regular line ministries, of which the Ministry of Health was the most important An interministerial Advisory Council was established to assure co-ordination among the various ministries expected to make inputs to the programme. The Chairman of the National Family Planning Co-ordinating Board (NFPCB) is chairman of this Council He reports directly and frequently to the President of Indonesia, a fact which greatly strengthens his authority vis-à-vis other ministries (The same arrangement would probably be impossible in a parliamentary system with ministerial responsibility in which all ministers, including the Prime Minister, are equally responsible to a legislature, not to a single official with centralized executive authority.) At the provincial and district levels, responsibility for the family planning programme has been given to the chief civil official of the area, to whom the NFPCB representatives report (just as the Chairman of the National Board reports to the President) On the basis of one year's experience, the system appears to be working well.

27. In addition to giving an improved organizational structure to the national programme, the IDA/UNFPA project provides these additional management supports:

(*a*) At the summit, three expatriate advisers were attached to NFPCB, at first for a two-year period only The foreign advisers—who are welcomed by the Board's senior staff—provide experience in programme planning and execution. Needless to say, such management help is expensive—the fact that half the cost will be covered by the UNFPA grant contribution will help greatly to make such expensive help acceptable;

(*b*) Within the management structure of NFPCB, the credit agreement required the reorganization of NFPCB, including the establishment of a new post of Deputy Chairman, before the Government was entitled to use any funds from the credit; an outstanding person, with wide experience in university and public administration, was subsequently appointed;

(*c*) To oversee the large construction programme and to assist NFPCB in setting up its accounting system, the credit agreement requires the Board to engage a qualified firm of management consultants. This solution was adopted after considerable debate as to whether individual advisers might not do the job just as well at considerably lower cost It was decided they could not, and the Indonesians accepted this judgement;

(*d*) Lastly, a strong management contribution will inevitably flow from the 38 man-years of expatriate technical assistance which will be funded by the credit. Much of this technical assistance will be provided by the United Nations Children's Fund (UNICEF), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Population Council. (The World Health Organization (WHO) is also providing important help, but under funds from outside the project.) What is called "technical assistance" will, in fact, provide "management assistance" at the level where these technical inputs are contributed—e g , the role of WHO in helping the Ministry of Health extend [illegible] fleet-control and vehicle-maintenance activities, the help extended by UNESCO in organizing and carrying out a programme of population education, and the role of the Population Council in organizing and monitoring a field post-partum demonstration project.

28. From this summary description of the Indonesia project, it should be clear that the Government has requested, and IDA and UNFPA have agreed, that achieving the needed level of management skills would require a rather substantial injection of technical assistance.

India

29. The fourth example of the approach of the World Bank[5] to the management problem comes from India, a country with a very well-developed public administration. Two distinguishing features of the Indian family planning programme are its age and the slow growth of acceptors in recent years, particularly in relation to the substantial increase in the costs of the programme. Although many dedicated and wise people have been working on the Indian population problem for several years, there are few ideas, and less agreement, about what needs to be done to recruit significantly larger numbers of acceptors

[5] The project in India is being jointly financed by the International Development Association and the Swedish [illegible]tional Development Authority

30. The response of the World Bank to this situation was to try neither to diagnose what was wrong nor to try to persuade the Indian Government to do what was needed. What ultimated emerged after more than a year of discussions between the Bank and the Government of India is a large-scale experiment in applied social science. In two very different states, Mysore and Uttar Pradesh, two separate population centres will be established. Each will assemble a professional staff of 25-30 demographers, statisticians, economists, sociologists and others from whatever disciplines their directors and their advisers believe would be useful. The directors—the "managements" of these two key institutions—are key people and the Bank has insisted they be given a senior status. Each centre is to be supported by technical assistance contracts to be signed with separate (Indian) academic institutions with experience in operational research. Thus, some well-established academic resources will provide support to two brand-new applied research organizations. Managing a five-year social science research and development effort is the essential task of the directors of the two new population centres. The purpose is to try to find out what no one in India today appears to know with any confidence: the combinations and intensities of programme inputs that will give the best results and the method that will achieve a much higher level of family planning acceptance and continuation than has so far been achieved. Unlike Indonesia, there is no input whatsoever of expatriate management or technical assistance, in view of the high quality of available Indian talent in the fields of population and management.

Malaysia

31. The five-year Malaysian project, co-financed by the World Bank and UNFPA, gives attention to some half a dozen management problems. Structurally, the Government agreed to appoint a Deputy Director of the National Family Planning Board (NFPB), a move designed to strengthen top management; to appoint maternal and child health/family planning (MCH/FP) officers in all 11 states covered by the project so as to set up centres for family planning administration at the state level, and to appoint an expatriate MCH/FP adviser to assist with the integration of the originally separate family planning service activities into the maternal and child health services of the Ministry of Health. There were also important agreements covering managerial procedures. For example, the Government agreed to appoint a management consulting firm to study and make recommendations on the administrative and other procedures used by NFPB and the Ministry. It also agreed to tighten up its programming activities by preparing a three-year plan of action designed to extend family planning services to 90 per cent of the population by 1975 and a longer term five-year plan covering the period 1976-1980. Some of these activities may well have been undertaken without the presence of a World Bank/UNFPA project, but the problems touched by these managerial changes probably receive more explicit attention and are taken with somewhat greater seriousness as a result of their incorporation into an agreement with external donors. These agreed steps for management improvement will be followed up by periodic reports and by field visits to see what progress is being made, i.e., by applying good management follow-up practices to the implementation of the agreement.

Iran

32. The $16.5 million loan to Iran, approved in May 1973, is almost wholly devoted to extending the health infrastructure, including a large number of training facilities. About 1.5 per cent of the loan is set aside to conduct a management study of the Government's family planning programme. For the World Bank and for several of the borrower's representatives, the management study is perhaps a more important part of the project than the bricks and mortar component. Iranian authorities are concerned about the location of a national population agency in the over-all government structure, the internal organization of such a body and its operating procedures. Consequently, an outside management consulting firm will study the problems and make recommendations for solutions for the Government. An attempt is being made to involve the management firm in the process of assisting in implementing its recommendations in order to minimize the danger that the study would become just another study that gathers dust on some forgotten shelf. The Government and the Bank expect the study to rationalize an organizational structure that was set up long before anyone could foresee the scale of the expanded programme which the Government is now trying to develop.

The use of management consultants

33. The World Bank and its borrowers have agreed to make use of management consulting firms in four of the nine projects[6] negotiated so far (individual management advisers were agreed on in two other cases). The firms engaged are not always or even usually specialists in family planning or even in health; their primary expertise is in the analysis of organization and management problems and in proposing ways of dealing with them. Funding agencies can make an important contribution to the establishment of sound family planning programmes if they insist that Governments give special attention to management problems, suggest (where appropriate) the use of consulting firms and assist Governments in selecting qualified firms.

CONCLUSION

34. This review began by emphasizing that "management", strictly defined, means the quality of key people in an organization. This definition was con-

[6] That is, the six projects reviewed above, plus projects in Egypt, Kenya, and Trinidad and Tobago.

sidered too narrow for operational analysis and the elasticity of the term was invoked to extend the discussion to problems of organizational structure, administrative procedures, and the evaluation of system performance. But even when one considers these impersonal aspects of family planning programmes, all issues affecting how well they work or how they might be improved come back to people. It is the people who count; the men (or women) who make all the difference are the top managers in any national programme

35. Nevertheless, the problem of management does not have its source in the quality of a programme's top management. To reach the ultimate source, one must climb the last step—to the top level of the political leadership of a country. If Presidents or Prime Ministers take population problems seriously, family planning programmes will tend to get better managers than if political leaders give population a low priority. As population problems do not have political interest groups to press their claims on political leaders, the amount of attention that the latter give to these problems depends chiefly upon the spread of awareness among the opinion-leaders in any country and upon the incorporation of population concerns among the leading ideas of the ruling thought of a country.

FAMILY PLANNING PROGRAMMES AND FERTILITY IN THE COUNTRIES OF THE ECAFE REGION *

Economic Commission for Asia and the Far East **

1. By the end of 1972, 31 countries were either members or associate members of the United Nations Economic Commission for Asia and the Far East (ECAFE). They covered a land area of 30 million km^2 from Iran in the west to Japan in the east and from Mongolia in the north to Australia and New Zealand in the south. The total population of these countries for 1972 was estimated to be 2 thousand million, 55 per cent of the total world population. During the 1960s, the population of the region had been growing at an annual rate of 2.2 per cent; and had that rate persisted, the population would have doubled by the year 2004. The net additions to the population of the ECAFE region during this century alone would thus exceed, under the current rates of growth, the population of the whole world that existed in 1925. Considering the current staggering size of the population and the appalling potential for future increase, the population problem of the world is essentially that of the ECAFE region. [1]

2. The problem is caused, in part, by the prevalence of high fertility rates in an era of declining death rates in the developing countries of the region. The prospects of further declines in infant and child mortality, coupled with a relatively young age distribution, portends an increasing proportion of men and women in the reproductive ages in the coming generation.

3. Although the region as a whole is beset by the population problem, there are considerable variations among the individual countries or areas in terms of population size and growth, socio-economic conditions and development. As for growth rates, the range of variation is indicated by the Philippines, with an annual growth rate of 3.4 per cent, at one extreme, and Japan, with 1.2 per cent, at the other. Similarly, on the economic front, Australia, Japan, and New Zealand have *per capita* incomes of over $1,500 per annum; Iran, Mongolia, Hong Kong and Singapore are in the range $400-800; and the remaining countries, constituting over 90 per cent of the population, have less than an estimated $400. (Figures for China were, however, not available.) In addition, the first group of countries is growing economically at rates much faster than the developing countries. As a consequence, the economic gaps between the developed and developing countries are widening every year. The region as a whole, though sprinkled with a few developed countries with slow rates of population growth, is characterized by teeming millions living in abject poverty and increasing at rates unprecedented in history. Whatever gains the developing countries would have achieved on the economic and social fronts because of planned development are eroded continuously because of rapid population growth. Indications are that conditions will deteriorate further in the near future if only because of the growing pressure of the population.

FAMILY PLANNING POLICY AND GOALS

4. Many of the Governments of countries or areas of the region are well aware of the problems caused by accelerated rates of population growth and have formulated policies and programmes to curtail these growth rates. Some of them have been pioneers in this direction, especially in the formulation of national family planning programmes designed to reduce the fertility levels of the population. During the 1960s, 24 out of the 31 countries or areas of the region had an official population policy backed by a national programme of family planning or supported voluntary efforts in family planning. Of these, 14 countries had population policies with national programmes and 10 others supported family planning efforts of voluntary organizations though they had no national governmental policies and programmes. Table 1 presents the list of such countries classified according to their current trends in fertility. Almost all the developing countries covering over 90 per cent of the region's population have population policies and family planning activities. The reasons cited by these countries for the adoption of family planning (or planned childbirth) as a national policy are oriented towards the economic betterment of the people, though improvement of the health of mothers and children and social development are also included as motives in some instances.

5. Many of the developing countries with official policies and programmes of family planning have stip-

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** Now the Economic and Social Commission for Asia and the Pacific.

[1] Data compiled from United Nations Economic Commission for Asia and the Far East, country reports for "Comparative study of service statistics systems for evaluation of family planning programmes", Bangkok, 1973 (to be issued as a United Nations publication).

TABLE 1 MEMBER COUNTRIES OR AREAS IN THE ECAFE REGION CLASSIFIED ACCORDING TO FERTILITY LEVEL AND POSITION OF THEIR GOVERNMENTS ON FAMILY PLANNING, AS OF 1971

	Position of the Government on family planning		
Fertility level	*Stated policy with programme* [a]	*No stated policy, but the Government supports or permits activities*	*No stated policy or Government-supported activity*
Low		Australia Japan New Zealand	
Declining	Fiji (1962) Malaysia (1966) Republic of Korea (1961) Singapore (1965) Sri Lanka (1965)	Hong Kong	
High	India (1952) Indonesia (1968) Iran (1967) Nepal (1966) Pakistan (1960) Philippines (1970) Thailand (1970) Tonga (1969) Western Samoa (1971)	Afghanistan British Solomon Islands Cook Islands Laos Papua New Guinea Republic of Viet-Nam	Bhutan Brunei Burma Khmer Republic Mongolia Nauru

[a] Figures in parentheses indicate year of policy formulation regarding population or family planning.

ulated demographic goals in terms of specific reductions in population growth rates or crude birth rates. There are 12 such countries, and their stated demographic goals as indicated in recent official documents are given in table 2. These demographic goals have been set by planners and economists in order to achieve substantial improvements in economic growth at the national macro-levels, in the first place. The balancing of the average individual preferences for family size with the national specifications of crude birth rates or growth rates has rarely been attempted. Recent knowledge, attitude and practice of family planning (KAP) surveys, however, indicate that average family sizes desired by individuals in the developing countries of the region are higher than those consistent with the demographic goals of the national family planning programmes Even the realization of the stipulated national demographic goals in these countries would yield very high rates of population growth Realization of the current levels of the desired family size of individual couples will certainly cause comparatively much higher rates of growth. It is also crucial to remember that the current fertility levels or the achieved family sizes are themselves higher than those stated to be desired by the families

6. The demographic goals vary widely among the countries in their scope and trends Some countries, such as India and Malaysia, specify the desired demographic levels at different future points of time; while other countries, such as Nepal, have defined their goals without a specific time limit While the specification of demographic goals in terms of crude birth rates can be made independent of assumptions of future mortality trends, specification of rates of population increase requires assumptions of both fertility and mortality trends. Out of 12 countries with demographic goals, six countries have stated these in terms of rates of population growth with or without birth-rate specifications, while the rest have stated their goal solely in terms of reduction in crude birth rates

7. Most of the developing countries in the region with demographic goals have annual family planning targets specified in terms of number of acceptors to be recruited by the programme over a five-year period or over longer intervals of time. Such family planning targets have been specified in terms of the total number of acceptors to be recruited by the programme, either irrespective of the type of method or specifically for each type of method. These targets usually form a part of the five-year development plans and are intended to be consistent with demographic goals. However, it is sometimes seen that the realization of family planning targets, usually set by programme administrators with an eye on feasibility, fall short of specified demographic requirements in terms of reductions in crude birth rates or population growth rates.

8. Table 3 provides information on family planning targets recently stipulated by selected countries in the ECAFE region for which official data are available It is found that with regard to the proportionate allocation of targets to various contraceptive methods, targets for sterilization are highest in India, for intra-uterine devices (IUD) in the Republic of Korea, and for oral pills in Thailand. Some countries, such as Indonesia, Malaysia and the Philippines, have set targets for the total number of acceptors

TABLE 2. DEMOGRAPHIC GOALS OF NATIONAL FAMILY PLANNING PROGRAMMES IN SELECTED COUNTRIES OF THE ECAFE REGION

Country	*Item*	*Level* *
Fiji	CBR	From an estimated CBR of 31 in 1968 to 25 by 1975 by protecting 35 per cent of women of reproductive age (1968)
Hong Kong	CBR	Maintain CBR at 20 through 1976 (1969 by Family Planning Association but supported by the Government)
India	CBR	From an estimated 39 in 1968 to 32 by 1973/74 and 25 by 1978-1979
Indonesia	CBR	Decrease level unspecified
Iran	NI	From 3 per cent in 1967 to 2 per cent (year unspecified)
Malaysia	(NI (CBR	Decrease to 2 per cent by 1985) From 38 in 1965 to 32 by 1975 and 26 in 1985)
Nepal	NI	Decrease to 2 per cent (year unspecified)
Pakistan	CBR	From 41 to 43 in 1970 to 33.2 in 1975
Philippines	NI	Reduction from an estimated over 3.1 per cent in 1971 to 2.5 per cent in 1976 (1971)
Republic of Korea	NI	Decrease to 2 per cent by December 1971 and 1.5 per cent by 1976
Singapore	CBR	From 22.1 in 1971 to 18 in 1975 (1972)
Sri Lanka	CBR	25 by 1975 (1968)
Thailand	(NI (CBR	To 2.5 per cent by 1976) (1972) From an estimated 41 in 1972 to 33 in 1976)

SOURCE: Data compiled from United Nations Economic Commission for Asia and the Far East, country reports for "Comparative study of service statistics system for evaluation of family planning programmes", Bangkok, 1973.

Note. CBR = crude birth rate.

NI = rate of natural increase.

* Targets as of 1970 unless otherwise specified.

by the programme without specifying the number to be recruited for various family planning methods, but oral pills have found the maximum acceptance within these countries. The annual targets set for the period from 1969 to 1976 for the number of acceptors of any method to be recruited by the programme range from about 5 per 1,000 population in Nepal to 40 per 1,000 population in the Republic of Korea.

FAMILY PLANNING PROGRAMME PATTERNS

9. Because programmes are implemented in accordance with their own policies and targets, family planning programmes in the ECAFE region vary widely in their organizational patterns, types of personnel involved, finances available, family planning methods advocated and targeted number of acceptors for recruitment into the programme. However, the basic operational objectives of the programmes in most of the countries remain the same, that is, the provision of necessary information and education to couples on the advantages of a small family and on the techniques of contraception; the fostering of group acceptance for small-family norms in the community; and the provision of contraceptive supplies and services to eligible couples in a socially and psychologically acceptable manner. Variations in organizational patterns, in educational and contraceptive delivery systems and financial inputs into the programmes arise essentially because of politico-administrative considerations, the perceived priority of the population problem in relation to other problems and the socio-cultural variables in the population. Table 4 presents data on some of the organizational, financial and personnel aspects of the programmes in the countries of the region.

10. Organizationally, all family planning programmes are integrated with public health or medical services. However, the degree of integration varies with respect to the availability of a separate budget for family planning, the extent of autonomy enjoyed by the family planning board or organization and the proportion of unipurpose workers employed especially at the peripheral levels. The programmes are classified in three categories as high, medium and low, depending upon the intensity of integration with public health programmes. The "high" category countries, namely, Fiji, Nepal and Sri Lanka, usually have no separate family planning budgets (separate from maternal and child health services or public health services), no autonomous family planning organization and a very low proportion of unipurpose family planning workers.

TABLE 3 FAMILY PLANNING ACCEPTANCE TARGETS IN SELECTED COUNTRIES OF THE ECAFE REGION[a]

	India (millions)					Republic of Korea (thousands)									Thailand (thousands)			
Year[b]	Sterilization	Intra-uterine device	Conventional contraception	Total	Indonesia (thousands)	Sterilization	Intra-uterine device	Pill	Condom	Total	Malaysia (thousands)	Nepal (thousands)	Philippines (thousands)	Singapore[c] (thousands)	Pill	Intra-uterine device	Sterilization	Total
1969	2 2	0.7	2 4	5 3								16						
1970	2 6	0 9	4 8	8 3								18						
1971 .	2 1	0.8	3.8	6.7	200	20	300	320	150	790	80	35	345	16	200	80	20	300
1972 .	2 6	0.9	4.3	7.8	550	23	300	250	150	723	100	60	581	16	235	90	25	350
1973					1,000	30	400	250	150	880	120		738	16	280	90	30	400
1974 ..					1,700	40	400	290	250	980	140		836	16	280	90	35	405
1975					2,500	50	400	320	250	1,020	160		727	16	280	90	40	410
1976						60	400	340	250	1,050			594		280	90	40	410
Achievement 1971	2 2	0.5	2 2	4 9	403	18 5	292	199	161	670.8	54 8	43 8	408 8	17.7	294 6	86	23 5	404 2
Proportion of target achieved	1 040	.576	.584	.723	2.015	.925	973	622	1.073	.849	.685	1 251	1 185	1 106	1.473	1.075	1.175	1.347

SOURCE: Data compiled from United Nations Economic Commission for Asia and the Far East, country reports for "Comparative study of service statistics systems for evaluation of family planning programmes", Bangkok, 1973.

[a] Most recent data available for five-year plan periods.
[b] Calendar year corresponding to 50 per cent or more of the fiscal year for which targets are set.
[c] Sterilization targets not included: 5,000-7,000 sterilizations estimated for 1972.

TABLE 4. PROGRAMME ORGANIZATION—FINANCE AND PERSONNEL [a]

Country or area	Finance					Personnel		
	Total expenditure on family planning for 1971 (thousands of dollars)	Per capita on family planning based on 1971 expenditure (United States cents)	Per capita on health in 1971 [b] (United States cents)	Cost per acceptor for earliest and latest available years (dollars)		Extent of integration with maternal and child health [d]	Ratio of medical family planning worker to total population, 1971 or later [e]	Ratio of paramedical family planning worker to total population, 1971 or later [f]
				1967	1971 [c]			
							1:	1:
Fiji	140[g]	26.6	916	...	5.08[g]	High	27,684	1,820
Hong Kong	66.4	1.6	. .	8.72	2.09	—	809,000[h]	106,447
India	78,792	14.4	24	9.58	15.80	Medium	128,175	20,703
Indonesia	7,668[i]	6.4	10	80.90[j]	14.73	Low	150,674	50,437
Iran	5,387	18.1	349	4.35[j]	13.99	Medium	26,823	22,679
Malaysia	774.6	8.2	785	14.48[k]	13.40[k]	Low	303,226[l]	42,153
Nepal	744[i]	6.6	46	10.76[j]	16.62[i]	High	868,385	27,007
Pakistan	...	. .	.	...	...	Medium	25,833	47,692
Philippines	1,868[i]	5.1	98	9.00	10.65	Low	27,459	14,992
Republic of Korea	2,501	7.7	43	4.33	3.76	Low	19,219	14,298
Singapore	169.3	8.0	1,251	2.89	9.51	Medium	55,537	5,147
Sri Lanka	...	. .	293[m]	...	...	High	4,273	1,735
Thailand	1,095	2.9	129	3.49[j]	2.71[n]	Medium	90,754	7,807

SOURCES: Most data are drawn from United Nations Economic Commission for Asia and the Far East, country reports for "Comparison study of service statistics systems for evaluation of family planning programmes", Bangkok, 1973. Data for Iran and Pakistan, and on certain items for other countries, are taken from Dorothy Nortman, *Population and Family Planning Programs: A Factbook*, Reports on Population/Family Planning, No. 2, 4th ed. (New York, The Population Council, 1972).

[a] Including only those countries identified in table 1 as having a national population policy; excluding Bangladesh, Tonga and Western Samoa, for which data are unavailable.

[b] Based on 1971 health budget.

[c] Based on total expenditures in column 1.

[d] Classification based on existence of separate budget, level of autonomy of the organization and proportion of unipurpose workers in family planning.

[e] Medical workers include part-time physicians.

[f] Excluding field personnel, e.g., field-workers, who perform family planning duties, due to their non-medical status.

[g] Involving the 1971 budget which estimates the contribution of a health-*cum*-family planning staff.

[h] Hong Kong programme is run by a voluntary association and therefore has a small number of physicians.

[i] Including foreign monetary inputs.

[j] 1968.

[k] Based on budgeted amounts because data on expenditures unavailable.

[l] Malaysia employs only eight full-time and 23 part-time physicians in its programme.

The "low" integration countries, such as Indonesia, Malaysia and the Philippines, have fully autonomous population and family planning boards, separate budgets and a very high proportion of unipurpose family planning workers. The "medium" integration countries are at intermediate levels in each of the three dimensions. The association between the extent of integration of family planning programmes with public health programmes and current fertility levels, rates of acceptance and use of contraception is in need of further investigation.

11. The numbers of medical and paramedical personnel employed in the programmes in relation to the population vary widely from country to country within the region. This is mostly due to differential proportions of part-time personnel, especially physicians, and other multipurpose workers involved in the family planning programmes.

12. The financial resources invested by national Governments in family planning programmes also vary widely and have increased sharply in all countries. For example, the *per capita* expenditure on governmental family planning programmes for the year 1971 ranged from 2.9 United States cents in Thailand to 26.6 in Fiji. The expenditures on family planning in relation to expenditure on public health vary considerably among the countries. In addition to these real variations, differences also occur because of mixed costs, fixed capital and foreign investments in the programme. It appears that in developing countries, in general, the rate of increase in health or medical expenditures has been much less than in family planning programmes.

13. The cost per acceptor recruited by the programme in the year around 1971 ranged from $2.71 in Thailand to $15.80 in India. Part of the difference can be due to differences in the computation of costs, especially inclusion or otherwise of foreign assistance to the programme, but the differences are mostly attributable to the differing emphases on various family planning methods. For example, the cost of recruiting an acceptor for oral pills or the traditional method can be expected to be lower than the cost for IUD insertion, which in turn will be considerably less than the cost for sterilization. Since oral pills are the contraceptive method propagated in the programme for Thailand and sterilizations have found large-scale adoption in India, a major portion of cost per acceptor could be explained by the type of methods adopted.

Programme achievement

Acceptance and use

14 The terms "acceptance", "acceptor", "use" and "user" of family planning methods have been used with varying definitions in different family planning programmes.[2] An Expert Group on Assessment of Acceptance and Use[3] has attempted to define acceptance and has distinguished between a "programme acceptor" and a "method acceptor" within a programme The term "use" is viewed as being related to the prevalence of family planning practice in general or of the practice of a specific method at a particular point of time, and is a function of acceptance and continuity of use With regard to IUD insertions or sterilizations, acceptance is synonymous with commencement of use. On the other hand, with regard to oral pills, condoms and other conventional or natural methods of contraception, acceptance cannot be equated with use, and the exact time of discontinuation of such methods by couples cannot be precisely specified as in the case of IUDs. Any comparison, therefore, of acceptance and use data with regard to different family planning methods will be defective from the beginning Comparisons between countries also could be misleading.

15. Acceptance and use of family planning methods by couples could be from programme sources or from outside the programme, from voluntary organizations, private physicians and commercial channels Acceptors and users outside the programme could have been motivated to do so by programme activities. There will always be a certain number of couples who substitute methods available from programme sources for their earlier contraceptive practices on considerations of cost, effectiveness of methods, etc. In these circumstances and those stated in paragraph 14, to evaluate the impact of a family planning programme just on the basis of the number of acceptors within the programme would be inappropriate. Any such analysis has to be supplemented by an analysis of levels and trends in contraceptive practices in the community as a whole irrespective of the source of such practice Therefore, any interpretation of acceptor data has to be viewed with caution.

16 Table 5 provides data on current and cumulative number of acceptors of different family planning methods in selected countries of the ECAFE region for which data are available. The current figures mostly represent acceptances for 1971 or 1972, while the cumulative total is usually for a four- or five-year period prior to and including 1973. The years are specified in the annex The acceptance rates for 1,000 population are also given for total acceptance as well as specifically for each method The data show considerable differences among countries with regard to current rates of new acceptances of any family planning method around the year 1971. Indonesia and Nepal have rates of less than 20 per 1,000 eligible women at one extreme, and Thailand and the Republic of Korea have rates of over 85 per 1,000 eligible women at the other extreme. Making a comparison by methods, India has the highest acceptance rate for sterilization, the Republic of Korea for IUD insertion, and Iran and Thailand for oral pills. If one compares current acceptance rates with the average annual acceptance rates for the previous five or six years, it is found that the acceptance rate for 1971/72 is much higher in the Philippines, Thailand *and Indonesia than their average annual performance* in earlier years (almost three to four times), and this is caused by phenomenal increases in the acceptors of oral pills. A large impetus to the family planning programmes in these three countries in the past few years has been provided through large-scale international [illegible]

[illegible]

workers.

17. Contraceptive methods become effective only if they are practised over a considerable spell of the fertility period of a married woman Continuation rates of contraceptive practices vary generally with methods and for the same method over countries, depending upon the motivations of couples and the nature of follow-up services rendered after acceptance. Continuation rates based on national samples of acceptors are not generally available The data usually available are from special follow-up studies of a sample of acceptors, carried out in selected areas of the country concerned, which may be representative of the nation as a whole. Table 8 (see annex) provides a selection of continuation rates at the end of 12 and 24 months, wherever available for different methods of family planning, for selected countries of the region Obviously, with regard to sterilization, the problem of continuation of the method does not arise and the method remains effective in preventing pregnancy during the entire duration of the marriage. With regard to other methods, it is found that the continuation rates vary among countries and between methods Continuation rates for the IUD at the end of 12 months has been found to be as high as 93 per cent in a study in Indonesia and as low as 56 per cent in Pakistan The median rate of continuation at the end of 12 months is found to be 70 per cent For oral pills, the continuation rates are much lower, and the range is from 35 to 76 per cent at the end of 12 months with a median value of 60 per cent after the first year

Proportion of contraceptive use within and outside the programme

18 The proportion of eligible couples using contraception at any time is a function of [illegible] of

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[2] *Evaluation of Family Planning Programmes*, Report of a Regional Seminar held at Bangkok, 24 November-12 December 1969, Asian Population Studies Series, No 5 (United Nations publication, Sales No E 70 II.F.20).

[3] *Assessment of Acceptance and Effectiveness of Family Planning Methods*, Report of an Expert Group, Asian Population Studies Series, No. 4 (United Nations publication, Sales No E 69 II F.15).

TABLE 5. CURRENT AND AVERAGE NUMBER OF ACCEPTORS AND CURRENT AND AVERAGE ACCEPTANCE RATES OF FAMILY PLANNING[a]

Country or area	Current number and rate of acceptors 1971	Cumulative number of acceptors[b]	Average number and rate of acceptors[c]	Intra-uterine device: Current number and rate 1971	Intra-uterine device: Cumulative number	Intra-uterine device: Average number and rate	Oral pill: Current number and rate 1971	Oral pill: Cumulative number	Oral pill: Average number and rate	Sterilization: Current number and rate 1971	Sterilization: Cumulative number	Sterilization: Average number and rate	Other programme methods: Current number and rate 1971	Other programme methods: Cumulative number	Other programme methods: Average number and rate	Programme years of operation
Fiji	27.6	...	...	7.7	...	...	9.3	...	...	6.8[d]	...	...	3.8	...	...	1962-1971
	...			...		...	...		...	...		...	...		...	
Hong Kong	31.8	239	23.9	3.2	58	5.8	24.2	76	7.6	0.9[e]	6.0	0.6	2.2	98	9.8	1961-1971
	(66.4)		(53.4)	(6.8)		(13.0)	(50.4)		(17.0)	(1.8)		(1.3)	(4.7)		(21.9)	
India[f]	4,874	12,481	1,783	478	4,548	649.7	...	...	...	2,162	10,822	1,546	2,235	...	...	1965-1972
	(51.8)		(20.2)	(5.1)		(7.4)	...	...	...	(23)		(17.5)	(23.8)		...	
Indonesia[f]	403	632	126.4	165	284	56.8	212	294	58.8	...	...	...	26	54	10.8	1967-1972
	(16.1)		(6.6)	(6.6)		(3.0)	(8.5)		(3.1)	...	...	...	(1.0)		(0.6)	
Iran	381	...	...	14.4	...	...	370.6	...	...	...	...	...	...	...	...	1967-1971
	(83.7)			(3.1)		...	(80.6)		...	...		...	...		...	
Malaysia	55	277	69.3	0.9	4.8	1.2	48	251	62.8	4.0	13.4	3.4	2.0	8.0	2.0	1967-1971
	(37.8)		(50.4)	(0.6)		(0.9)	(33.2)		(45.7)	(2.6)		(2.4)	1.4		(1.5)	
Nepal[g]	43.8	125.7	25.1	1.2	8.6	1.7	15.9	41.2	8.2	3.9[g]	16.6	3.3	22.9	59.4	11.9	1966-1971
	(20.0)		(12.1)	(0.5)		(0.8)	(7.3)		(4.0)	(1.8)		(1.6)	(10.5)		(5.7)	
Pakistan	...	...	...	314[i]	...	...	...	...	..	8[i]	...	...	...	...	...	1964-1971
	...		...	(26.2)		..	...		..	(0.7)		...	...		..	
Philippines	408.8	703.6	117.3	80.5	147.3	24.6	246	393.9	65.7	...	...	...	83	161.9	27.0	1965-1971
	(83.4)		(26.3)	(16.4)		(5.5)	(50.1)		(14.7)	...	...	...	(16.9)		(6.1)	
Republic of Korea	665	5,772	824.6	294[j]	3,566[j]	509.4	191	788[k]	112.6	19	146	20.9	161	1,272	181.7	1964-1971
	(166.3)		(221.9)	(73.5)		(137.1)	(47.8)		(30.3)	(4.8)		(5.6)	(40.3)		(48.9)	
Singapore	17.8	174	34.8	0.4	9.1	1.8	9.5	92.4	18.5	3.9	9.8	2.0	7.4	72.8	14.6	1966-1971
	(65.9)		(134.4)	(1.5)		(7.0)	(35.2)		(71.4)	(14.4)		(7.6)	(27.4)		(56.2)	
Sri Lanka	49.3	239.8	48.0	11.5	85.9	17.2	25.8	105.6	21.1	4.2	24.1	4.8	7.6	33.2	6.6	1966-1971
	(27.1)		(27.8)	(6.3)		(10.0)	(14.2)		(12.2)	(2.4)		(2.8)	(0.4)		(3.8)	
Thailand	404.2	946.9	157.8	86.0	336.4	56.1	294.6	505.4	84.2	23.5	105.1	17.5	...	...	...	1965-1971
	(86.0)		(36.5)	(18.3)		(13.0)	(62.7)		(19.5)	(5.0)		(4.1)	...	...	...	

SOURCES: United Nations Economic Commission for Asia and the Far East, country reports for "Comparative study of service statistics systems for evaluation of family planning programmes", Bangkok, 1973; where specific data unavailable, Dorothy Nortman, *Population and Family Planning Programs: A Factbook*, Reports on Population/Family Planning, No. 2, 4th ed. (New York, The Population Council, 1972).

. . . Method not included in programme statistics regularly.
[a] Number of acceptors given in thousands and the acceptance rate per 1,000 married women in the reproductive ages (15-44) was given in parentheses.
[b] Cumulative since programme's inception.
[c] Average number of acceptors was cumulative total divided by years of operation.
[d] Female sterilizations only.
[e] Sterilizations applied for.
[f] Fiscal year ended on 31 March. Thus current figures were for 1 April 1971 to 31 March 1972.
[g] Nepalese fiscal year began in mid-July of one year and ended at mid-July of the next year.
[h] Vasectomies only.
[i] 1970 data, 1971 figures were unavailable.
[j] Reinsertions at six or more months after termination of original IUD were included in this figure.
[k] Cumulative since 1968 when oral pill was introduced as a programme method.

acceptance of methods in earlier years and the attrition or discontinuation of methods over a period of time. With low acceptance rates, if the continuation rates are high, the proportion using contraception can build up substantially as in the case of sterilization; and, conversely, even under high rates of acceptance with high rates of attrition, the proportion using contraception at any time can remain low, as in the case with oral pills in some countries. The proportion of eligible couples using contraception from programme sources around 1971 for different countries of the region is given in table 6, which also provides estimates of the proportion using contraception from all sources including non-programme ones.[4] It is seen from table 6 that there is a positive association between proportions of couples using contraception from programme and non-programme sources, implying that in developing countries organized family planning programmes, at least in the first years, tend to supplement and promote contraceptive practice outside the programme. This finding runs against the belief entertained in some quarters that programme acceptors are essentially substitutors from non-programme sources

[4] Dorothy Nortman, *Population and Family Planning Programs A Factbook*, Reports on Population/Family Planning, No 2, 4th ed (New York, The Population Council, 1972)

TABLE 6 CONTINUATION RATES FOR INTRA-UTERINE DEVICE AND ORAL PILL AND PROPORTIONS OF USERS OF FAMILY PLANNING

	Continuation rates				*Users of programme service, as a percentage of married women aged 15-44, 1971 or 1972*					*Users of all sources as a percentage of MWRA (all methods) 1971 or 1972*
	Intra-uterine device		*Oral pill*							
Country or area	*12 months*	*24 months*	*12 months*	*24 months*	*Intra-uterine device*	*Oral pill*	*Sterilization*	*Other programme methods*	*Total*	
Fiji					6.4	7.7	5.7	3.2	23[a]	
Hong Kong	66	49	58		4 0	10 0	1.0	4 0	19	54
India	77[b]	54[b]	60[b]							13.2
Indonesia	93[c]	84[c]			0 3	0.2		0 1	0.5	
Iran	63[d]	45[d]	54[d]	37[d]	0.6	0 7				
Malaysia	68[e]	52[e]	62[e]	47[e]					8 0[f]	
Nepal	80[g]	70[g]			0.1	0 6	0 4	1.3	2 5	
Pakistan	56		62	47	7 0	0 0	5.0			
Philippines	86[h]	73[h]	67[h]	50[h]	1 9	4 9		1.3	8.1	8.1
Republic of Korea	57	38	35[i]		7 0	6 8	3.3	6 4	23.5	30 0
Singapore	69		48[j]	36[j]		15 6	2 8			
Sri Lanka	79[j]	70[j]	41[j]							
Thailand	76[k]	56[k]	67, 76[l]		4 0	7.1	2.2		13.3	18 7

SOURCES. Except as noted, continuation rates extracted from R. Lapham and W. P. Mauldin, "National family planning programmes review and evaluation", *Studies in Family Planning*, vol. 3, No 3 (March 1972), table 5 Years of conti-

[d] Population Council, "International Post-partum Pro-

planning programme in charts"

tively.

gramme sources, implying that in developing countries organized family planning programmes, at least in the first years, tend to supplement and promote contraceptive practice outside the programme. This finding runs against the belief entertained in some quarters that programme acceptors are essentially substitutors from non-programme sources

Number of births averted due to the programme

19 Many estimates of births averted, using methods of varying complexity, have been made by various authors in countries of the ECAFE region, especially for IUDs and oral pills Table 7 presents data on the estimates of "births averted" during the fiscal year 1971/72, for selected countries of the region as reported in official documents. Estimates for three countries of the cumulative number of births averted, because of the existence of a programme since the inception of the programme for different methods of contraception, are also provided in the same table. Since the techniques used and assumptions involved for arriving at these estimates have varied widely from country to country, any comparative interpretation of the estimates has to be undertaken with extreme caution.[5] Furthermore, it should be recognized that the births averted in any calendar year are realized over a number of years commencing the same calendar year, and hence the

[5] Any estimate of births averted by a programme essentially depends upon four factors: the number of couples accepting contraception by method, the rates of continuation of methods, the effectiveness of methods; and the potential fertility of the acceptors

"births averted" estimates given in table 7 are justifiably credited to future years. From the table, it can be seen that the number of births averted because of the existence of programmes during 1971/72 range from 5,771 in Indonesia to 2.6 million in India. The cumulative number of births averted because of total programme performance since the inception of the programme range from 34,000 in Singapore to 10 million in India. The high estimate of births averted in India is due to a large number of sterilization operations carried out in that country since the inception of the programme.

TABLE 7. ESTIMATES OF BIRTHS AVERTED

Current		
India	(1971-1972)	2,555,000
Indonesia	(1971-1972)	5,771
Philippines	(1971)	34,300
Republic of Korea	(1970)	144,000
Thailand	(1971)	43,500
Cumulative		
India	(1965-1972)	10,000,000
Singapore	(1966-1970)	33,738
Thailand	(1965-1971)	104,400
Method		
Intra-uterine device		
Nepal	(1970-1971)	461[a]
Philippines	(1971)	10,800
Republic of Korea	(1970)	109,000
Singapore	(1970)	3,144
Oral pill		
Nepal	(1970-1971)	737
Philippines	(1971)	20,100
Singapore	(1970)	18,147
Vasectomy		
Nepal	(1970-1971)	13,039
Republic of Korea	(1970)	36,000
Other methods		
Philippines	(1971)	3,400
Republic of Korea	(1970)[b]	10,000
Singapore	(1970)	12,447

SOURCE: Data compiled from United Nations Economic Commission for Asia and the Far East, country reports for "Comparative study of service statistics for evaluation of family planning programmes", Bangkok, 1973.

[a] Over the next five years.

[b] By condom.

IMPACT OF THE PROGRAMME ON FERTILITY

20. Measuring the impact of family planning programme achievement on fertility is at best a difficult endeavour, faced with numerous unsolved questions. The difficulties encountered in such an enterprise can be classified into three areas: conceptual, analytical and data-related. It is necessary to examine the nature of these problems briefly before presenting the available evidence concerning programme impact on fertility.

Measurement problems

21. First, levels and changes in human fertility are at the same time both causes and consequences of levels and changes in the socio-economic structure. The origin of the cause is not always apparent. Although important, the family planning programme is just one of the multitude of socio-economic variables affecting fertility. As a consequence, when fertility levels do change in a population, it is difficult, if not impossible, to isolate the effects of programmes from those of other socio-economic changes occurring concomitantly in the community. It is also difficult to isolate the indirect effects of the programme from its direct effects.

22. Secondly, there are the analytical problems in the assessment of demographic impact, although these are interlinked with the data problems. Analytical techniques currently available are far from satisfactory and appear to be in their early stages of development. The fundamental problem appears to be the separation of the effects on fertility due to each of three major components, namely, unknown factors, known but uncontrollable (or immutable) factors and known and controllable factors. The effect of the first set of factors is generally assumed to be random after the consideration of all known factors. The known but immutable factors include "age-sex-marital status" distribution of the population, biological factors, education, occupational structure etc., which cannot be altered in the short run. The mutable factors include the family planning programme and such other major forces as can be manipulated by the Government and voluntary organizations for modifying fertility trends. The conventional statistical techniques such as analysis of variance, correlation and regression methods, though widely used in recent years, appear to have strong limitations in the analysis of human fertility, since the interactions of factors appear to be more significant and the unexplained component of variance is quite large.

23. Another difficulty surrounding the problem is the choosing of sensitive and reliable indexes of fertility capable of reflecting the impact of family planning programmes as early as possible. In recent years, various indexes of fertility and various methods of computing conventional fertility indexes from incomplete or deficient data have been proposed. However, there is a strong interaction between the quality of data and the nature of analytical methods and type of fertility index used in the analysis. Data of very poor quality and reliability cannot justify the application of complex analytical techniques utilizing many parameters of the population. From the analytical point of view, the identification of the factors influencing fertility and the estimation of the unknown or unexplainable portion of fertility, the time lag and the choice of appropriate fertility indexes appear to be some of the important problems. The data needed for such analysis can be obtained only through specially designed surveys.

24. Thirdly, there are the data problems. It is unfortunate that precisely in those countries in the developing world where the need for evaluating the impact of family planning programmes on fertility is greatest, the paucity of data needed for such an assessment is

most acutely felt. There are essentially four sources of data for any demographic evaluation of programmes: censuses; vital registration; family planning service statistics systems; and sample surveys. Censuses are usually taken every tenth year and collect information on only a few items Similarly, the vital statistics systems in most of the developing countries still generate data that are too deficient in quality and coverage for any meaningful use by family planning programmes. In the meantime, information on levels and trends in fertility and factors contributing to changes therein are urgently needed for a variety of reasons, family planning evaluation being one of them Sample surveys can usefully fill in this data gap.

25. The data collected through the family planning service statistics system relates to the number and characteristics of acceptors of family planning methods from within the programme With data on past fertility of acceptors and rates of continuation of family planning methods, it is possible to work out to some extent the births averted by the programme using some of the recently developed techniques. However, the total impact of the programme on the fertility levels of the population as a whole can be studied only by examining the behaviour of both acceptors and non-acceptors, i e., the community as a whole. Without prior knowledge of the extent and nature of pre-programme contraceptive practice by programme methods, it is impossible to assess the fertility impact of family planning programmes The changes in the size and characteristics of the three groups—programme acceptors, non-programme acceptors and non-acceptors of family planning methods—over a period of time can only be studied by community surveys conducted at periodic intervals. Neither the data from service statistics systems nor those from follow-up surveys of acceptors are adequate to meet this need The nature of the interrelationship between programme input and contraceptive acceptance on the one hand, and contraceptive practices and fertility changes on the other, cannot be fully investigated without studying the community as a whole or a random sample of it

Empirical findings on the assessment of programme impact on fertility

26 Despite the difficulties mentioned earlier, attempts at assessing programme impact on fertility have not been lacking. Some of the findings from these attempts are examined below. The following questions appear related to such an examination:

(*a*) Whether such programme efforts (input) are related to programme acceptors (output), and whether such a relationship is influenced by the socio-economic conditions in the countries;

(*b*) To what extent such programme acceptors contributed to the fertility reduction;

(*c*) Whether the countries with a national family planning programme have actually had a declining trend in fertility over the years

Relationship between input and output (acceptance

27. In an extensive analysis of the relationship tween acceptance rate and various administrative i measures undertaken by the programmes in 20 c tries within the ECAFE region and outside, Lap and Mauldin observed:

"... the higher acceptor-rates countries tend to contraception readily and easily available in both public and private sectors and they tend to carry vigorous efforts to provide all couples with serv the lowest acceptor-rate countries fall almost ent in the 'partially' category on these two criteria. extensive use of field workers and mass media show strong differences between the higher and l acceptor-rate groups."[6]

They also demonstrated that, in 1970, the accept and the use of contraception within the progra occurred under rather widely ranging social, econ and health conditions Among many ecological fa considered for association with family planning p tice, it was found that the percentage of married wo in the reproductive age (MWRA) practising contra tion was highly correlated with the percentage of p lation residing in urban areas.

Programme acceptance and fertility

28. After reviewing the findings of a real ana of fertility changes with the number of acceptors, gramme activity and other socio-economic charact tics in countries in the ECAFE region, one s observes:

"Multiple regression analysis of small areas i cates that areas with higher acceptance rates or n program activity tend to have larger decrease fertility. Program effects appear to equal or ex those of socio-economic change even w where modernization is rapid

"...

"Studies using experimental and control areas shown that the former tend to have greater fert decline.

"...

"Geographic comparisons of fertility change, trasting program areas with nonprogram area roughly equivalent character, have found larger tility declines in the program areas. Because the kinds of areas are not matched in any strict se the role of uncontrolled influences must be judici ly assessed; nevertheless, the results suggest prog influence

"...

"Attention to the relation between the timin program activity and the appearance of unusual

[6] R. J. Lapham and W. P Mauldin, "National family ning programs review and evaluation", *Studies in Fa Planning*, vol 3, No 3 (March 1972).

"births averted" estimates given in table 7 are justifiably credited to future years. From the table, it can be seen that the number of births averted because of the existence of programmes during 1971/72 range from 5,771 in Indonesia to 2.6 million in India. The cumulative number of births averted because of total programme performance since the inception of the programme range from 34,000 in Singapore to 10 million in India. The high estimate of births averted in India is due to a large number of sterilization operations carried out in that country since the inception of the programme.

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22. Secondly, there are the analytical problems in the assessment of demographic impact, although these are interlinked with the data problems. Analytical techniques currently available are far from satisfactory and appear to be in their early stages of development. The fundamental problem appears to be the separation of the effects on fertility due to each of three major components, namely, unknown factors, known but uncontrollable (or immutable) factors and known and controllable factors. The effect of the first set of factors is generally assumed to be random after the consideration of all known factors. The known but immutable factors include "age-sex-marital status" distribution of the population, biological factors, education, occupational structure etc., which cannot be altered in the short run. The mutable factors include the family planning programme and such other major forces as can be manipulated by the Government and voluntary organizations for modifying fertility trends. The conventional statistical techniques such as analysis of variance, correlation and regression methods, though widely used in recent years, appear to have strong limitations in the analysis of human fertility, since the interactions of factors appear to be more significant and the unexplained component of variance is quite large.

23. Another difficulty surrounding the problem is the choosing of sensitive and reliable indexes of fertility capable of reflecting the impact of family planning programmes as early as possible. In recent years, various indexes of fertility and various methods of computing conventional fertility indexes from incomplete or deficient data have been proposed. However, there is a strong interaction between the quality of data and the nature of analytical methods and type of fertility index used in the analysis. Data of very poor quality and reliability cannot justify the application of complex analytical techniques utilizing many parameters of the population. From the analytical point of view, the identification of the factors influencing fertility and the estimation of the unknown or unexplainable portion of fertility, the time lag and the choice of appropriate fertility indexes appear to be some of the important problems. The data needed for such analysis can be obtained only through specially designed surveys.

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most acutely felt. There are essentially four sources of data for any demographic evaluation of programmes: censuses; vital registration; family planning service sta- [illegible]

most of the developing countries still generate data that are too deficient in quality and coverage for any meaningful use by family planning programmes. In the meantime, information on levels and trends in fertility and factors contributing to changes therein are urgently needed for a variety of reasons, family planning evaluation being one of them. Sample surveys can usefully fill in this data gap.

25. The data collected through the family planning service statistics system relates to the number and characteristics of acceptors of family planning methods from within the programme With data on past fertility of acceptors and rates of continuation of family planning methods, it is possible to work out to some extent the births averted by the programme using some of the recently developed techniques. However, the total impact of the programme on the fertility levels of the population as a whole can be studied only by examining the behaviour of both acceptors and non-acceptors, i e, the community as a whole Without prior knowledge of the extent and nature of pre-programme contraceptive practice by programme methods, it is impossible to assess the fertility impact of family planning programmes. The changes in the size and characteristics of the three groups—programme acceptors, non-programme acceptors and non-acceptors of family planning methods—over a period of time can only be studied by community surveys conducted at periodic intervals Neither the data from service statistics systems nor those from follow-up surveys of acceptors are adequate to meet this need The nature of the interrelationship between programme input and contraceptive acceptance on the one hand, and contraceptive practices and fertility changes on the other, cannot be fully investigated without studying the community as a whole or a random sample of it.

Empirical findings on the assessment of programme impact on fertility

26 Despite the difficulties mentioned earlier, attempts at assessing programme impact on fertility have not been lacking Some of the findings from these attempts are examined below. The following questions appear related to such an examination:

(*a*) Whether such programme efforts (input) are related to programme acceptors (output), and whether such a relationship is influenced by the socio-economic conditions in the countries;

(*b*) To what extent such programme acceptors contributed to the fertility reduction;

(c) Whether the countries with a national family planning programme have actually had a declining trend in fertility over the years.

Relationship between input and output (acceptance)

27. In an extensive analysis of the relationship between acceptance rate and various administrative input measures undertaken by the programmes in 20 countries within the ECAFE region and outside, Lapham and Mauldin observed:

> " . the higher acceptor-rates countries tend to have contraception readily and easily available in both the public and private sectors and they tend to carry out vigorous efforts to provide all couples with services; the lowest acceptor-rate countries fall almost entirely in the 'partially' category on these two criteria. The extensive use of field workers and mass media also show strong differences between the higher and lower acceptor-rate groups "[6]

They also demonstrated that, in 1970, the acceptance and the use of contraception within the programme occurred under rather widely ranging social, economic and health conditions Among many ecological factors considered for association with family planning practice, it was found that the percentage of married women in the reproductive age (MWRA) practising contraception was highly correlated with the percentage of population residing in urban areas.

Programme acceptance and fertility

28. After reviewing the findings of a real analysis of fertility changes with the number of acceptors, programme activity and other socio-economic characteristics in countries in the ECAFE region, one study observes·

> "Multiple regression analysis of small areas indicates that areas with higher acceptance rates or more program activity tend to have larger decreases in fertility. Program effects appear to equal or exceed those of socio-economic change . even where where modernization is rapid
>
> "...
>
> "Studies using experimental and control areas have shown that the former tend to have greater fertility decline.
>
> "...
>
> "Geographic comparisons of fertility change, contrasting program areas with nonprogram areas of roughly equivalent character, have found larger fertility declines in the program areas. Because the two kinds of areas are not matched in any strict sense, the role of uncontrolled influences must be judiciously assessed; nevertheless, the results suggest program influence
>
> "...
>
> "Attention to the relation between the timing of program activity and the appearance of unusual fer-

[6] R J Lapham and W. P. Mauldin, "National family planning programs· review and evaluation", *Studies in Family Planning*, vol. 3, No 3 (March 1972).

tility declines in an area suggests that programs have been causally related to fertility change.

"...

"Matching of areas as units has indicated program effects."[7]

29. Similarly, on the basis of a simple correlational analysis of levels of crude birth rate around 1970, in the countries of the ECAFE region and outside, with the proportion of contraceptive users from programme sources and all sources as well as with the cumulative number of acceptors, Potter and Rao[8] found correlation coefficients of the order of —.83, —.76 and —.60, respectively, indicating strong negative associations between fertility and level of cumulative acceptance and use of contraception. The same magnitude of association was also noticed between the crude rate of natural increase of population and cumulative rates of contraceptive acceptance and use.

30. The impact of the programme on the fertility of acceptors of family planning methods has been assessed, by matched comparisons of the fertility of acceptors with that of a control group (matched on the basis of various socio-economic characteristics as well as past fertility), by before-and-after comparisons of fertility of acceptors and by computer simulation. Matched comparisons have been made on the basis of group or individual characteristics. After reviewing the findings from a number of studies carried out in this manner, mostly in the countries of the ECAFE region, Ross and his associates make the following observations:

"Fertility declines among program acceptors are greater than among non-acceptors matched for other characteristics.

"Acceptors in family planning programs experience lower fertility after acceptance than before.

"Acceptors tend to have higher fertility rates before acceptance than the general population of married women.

"Acceptors in some programmes who have terminated the initial method or have become pregnant while using it have resorted to supplementary methods of contraception and to abortion to help keep their post-acceptance fertility low; some of the contraception is program-provided."[9]

Fertility trend over a period of time

31. The data as shown in table 8 indicate the crude birth rates and percentage changes in these rates over different periods of time that could be attributed to changes in the age structure of the population, portion of women married and changes in marital fertility rates for Hong Kong, Malaysia, the Republic of Korea, Singapore and Sri Lanka, using techniques of standardization. Where substantial declines in fertility have been observed in the past decade, changes in marital fertility have accounted for anything between 0 per cent and 89 per cent of the changes in crude birth rates in different countries or areas for different periods of time. In the same country the contribution of change in marital fertility towards crude birth rate change has varied. For example, in Sri Lanka, during the years from 1953 to 1968, there was a seven-point decline in crude birth rate and almost all this decline was caused by structural changes in the age-marital distribution of the population. On the other hand, during the period 1968-1970, there was a decline of three points in the birth rate, and 89 per cent of this decline was caused by changes in marital fertility rates. In this connexion, it has been observed that the high proportions of contraceptive users, together with the large role of marital fertility declines in changing crude birth rates, suggest that contraceptive use, and often predominantly programme contraceptive use, has been important in effecting fertility decline in a variety of countries.[10] The role of induced abortion must also be recognized; its importance in relation to contraception varies by country. A study in the Republic of Korea indicated that, out of an over-all decline of about 30 per cent in the total fertility rate during the period 1960-1968, the component of age at marriage accounted for 12 per cent, the component of abortion for 6 per cent and the family planning component for 11 per cent.[11] Thus, the family planning programme was responsible for only one third of the decline in fertility.

32. Empirical evidence accumulated so far on the impact on fertility of family planning programmes indicates that family planning programmes and socio-economic development are an interacting process and that the effect of any one process cannot be assessed without considering the other. The programmes appear to have had a widely differing impact on the fertility levels in different countries. Apart from countries with younger programmes, such as Indonesia, the Philippines and Thailand, the countries with national programmes in operation for seven or eight years can be classified in two categories in terms of fertility trend: (*a*) those wherein significant trends of decline in birth rate and total fertility rates have been achieved, but where an incipient fertility decline was already evident at the time family planning programmes were introduced; and those where n [illegible] ing trend in fertility has yet observed a [illegible] re was no incipient fertility at the ti [illegible] tion of the programme.

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[7] J. A. Ross and others, *Findings from Family Pla[illegible] Research*, Reports on Population/Family Planning, N[illegible] (New York, The Population Council, 1972).

[8] R. G. Potter and S. L. N. Rao, "Demographic situatio[illegible] relation to factors affecting population change", paper prese[illegible] at the Second Asian Population Conference held in Tok[illegible] 1-13 November 1972.

[9] J. A. Ross and others.

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TABLE 8. FACTORS ASSOCIATED WITH FERTILITY CHANGE FOR FIVE COUNTRIES IN THE ECAFE REGION

Country or area, year programme began, and year of data	Crude birth rate	Change in crude birth rate (percentage)	Percentage of change in crude birth rate due to change in				Percentage of married women using contraception			
			All factors	Age structure	Percentage married	Marital fertility	Total	Source: Public	Source: Private	Age
Hong Kong (1936)										
1961	35 5		(1961-1965)							
1965	28 8	−18 9	100	79	10	11				
1966	25 8	−10 4	(1965-1967)							
1967	24 6	− 4 7	100	13	0	87	42			15-44
1968	21.3	−13.4								
1969	20.7	− 2.8								
1970	19 4	6 3					50	17	33	15-44
Republic of Korea (1962)										
1958	44 8									
1959	43.7	− 2 5								
1960	42.9	− 1 8								
1961	42.2	− 1.6								
1962	40 0	− 5.2								
1963	38.2	− 4.5								
1964	34 4	− 9.9					9			20-44
1965	31.3	− 9 0	(1957/1961-1962/1966)				16			20-44
1966	32 0	+ 2.2	100	6	33	61	20			20-44
1967										
1968	30	6 7					30	25	5	20-44
1969										
1970	30	0					32	28	4	15-44
West Malaysia (1966)										
1957	46 2									
1957-1961	42 9	− 7.1	(1957-1962/1966)							
1962-1966	38 6	−10 0	100	−20	41	79	9			15-44
1970	37	− 4 1					13	5	7	15-44
Singapore (1966)										
1957	42.7		(1957-1966)							
1966	28 6	−33.0	100	0	63	37				
1970	22	−23.1					45	27	18	15-44
Sri Lanka (1966)										
1953	39.4		(1953-1963)							
1963	34 6	−12.2	100	57	43	0				
1964	33.3	− 3.8					...	.		
1965	33 2	− 0 3								
1966	32.3	− 2.7								
1967	31 6	− 2 2	(1963-1968)							
1968	32 1	+ 1.6	100	−31	132	0				
1969	30 4	− 5 3	(1968-1970)							
1970	29.4	− 3 2	100	−21	30	89	8+	7	1+	15-44

SOURCE: J. A. Ross and others, *Findings from Family Planning Research*, Reports on Population/Family Planning, No. 12 (New York, The Population Council, 1972).

The Republic of Korea and Singapore are examples of the first group, while India and Pakistan are examples of the second In those countries where there has been an incipient decline in fertility prior to the commencement of their programmes and where the rates of socio-economic development are high, family planning programmes have tended to accelerate the fertility decline.

33. The above described pattern of fertility trends [illegible] may suggest that fertility decline [illegible]

"public family planning programs can be seen as an important and 'natural' part of the demographic modernization process [illegible] . experience so far *has* shown demographic modernization, i e. falling fertility, to be a concomitant of all-around modernization and economic development".[12]

SUMMARY

34. The past decade has witnessed the emergence of national family planning programmes in many countries of the ECAFE region, undertaken with the major objec-

[12] H. M Raulet, "Family planning and population control in developing countries", *Demography*, vol 7, No. 2 (May 1970).

tive of reducing the fertility rate or the population growth rate to predetermined levels considered optimal for economic development.

35. The operational objectives of these programmes are basically similar in that all programmes try to reach the general population in providing education and information on advantages of small family norms and techniques of contraception and in making available contraceptive services and supplies to the eligible couples in an acceptable manner. The implementation strategies for these programmes have, however, varied considerably.

36. The progress, in terms of acceptance, achieved by several of these programmes has been impressive. Effectiveness of the programmes reflecting impact on fertility has not, however, been precisely determined due to several measurement problems—conceptual, methodological and data-related. Broad analyses, however, indicate that high acceptance rates in certain programmes have been associated with a concomitant decline in fertility levels even after other demographic factors, such as age distribution and age at marriage, are taken into account.

37. Fertility reduction is greatly affected by the interaction between the programme efforts and other developmental efforts. In those countries where there has been a substantial decline in the fertility levels, there has been concomitantly rapid socio-economic development, indicated by increase in *per capita* income, literacy levels, employment of women and the proportion of non-agricultural population.

38. Significant decreases in fertility have also been observed in those countries where an incipient fertility decline was already in evidence at the time of the beginning of the national programmes.

STATISTICAL AND HEALTH ASPECTS OF ABORTION

*Christopher Tietze**

1. This report presents a brief overview of data on *induced abortion in the world today*, primarily as they concern its demographic and public health impact.[1]

2. As used by the medical profession, the term "abortion" refers to the termination of a pregnancy before the foetus has attained viability, that is, before it is capable of independent extra-uterine life. According to tradition, viability, defined in terms of the duration of the pregnancy and/or foetal weight, is attained after 28 weeks of gestation, counting from the first day of the last normal menstrual period, corresponding to a foetal weight of approximately 1,000 grams. This definition was based on the observation that infants weighing less than 1,000 grams had little chance of survival and that the mortality of infants above 1,000 grams declined rapidly with increasing weight. In recent years, many medical textbooks have lowered gestational age at abortion from 28 weeks to 20 weeks, or less, corresponding to a foetal weight of 500 grams or less, because some of these tiny infants have, in fact, survived.

3. Abortions fall into two major categories—induced and spontaneous. Induced abortions are initiated voluntarily with the intention to terminate pregnancy. All other abortions are designated spontaneous, even if an external cause is involved. Induced abortions can be subdivided into those which are legal and those which are illegal, as defined by the laws of individual countries. In this report, unless otherwise noted, the term abortion refers to all induced abortions—legal or illegal.

4. Illegal abortions are frequently performed by unqualified persons under insanitary conditions, thus increasing the risk of infection and other complications. In most cases, the diagnosis requires information from the woman, members of her family or the abortionist. When such information is lacking, it is rarely possible, either clinically or at autopsy, to differentiate between induced and spontaneous abortion. Although the medical profession tends to consider septic abortions to be induced, many induced abortions show no signs or symptoms of infection, whereas some spontane abortions do.

5. Most of the tables in this report are based official statistics of legal abortions from countries wh restrictive abortion laws have been replaced by libe laws at various times since the late 1930s. In gene these laws provide for reporting to the health authori of all abortions performed under the provisions of statute; and in most of the countries, but not in national statistics are published periodically.[2]

6. Efforts to estimate the incidence of illegal ab tion have been far from successful. Many responde who are willing to be interviewed on their contracept practices will not talk about their experience w illegal, or even legal, abortion. The classic example the unwillingness of interviewees to report their ab tions is the Hungarian Fertility and Family Plann Study of 1966, conducted a decade after the legalizat of abortion in that country, where the number of ab tions reported by the respondents for the years 19 1965 corresponded to 50-60 per cent of the numl known to have been performed.[3]

7. The incidence of abortion can be assessed relating the number of abortions to the number women at risk and to the number of births or pr nancies. The types of information obtained by th two approaches are different but complementary. this report, measures relating abortions to women to the total population) are termed rates, and th relating abortions to births or pregnancies are ratio

8. The importance of making a sharp distincti between abortion rates and abortion ratios is illustra by the following example. Assume two countries, ea with a population of 1 million, one with 45,000 l births and 9,000 abortions and the other with 15,0 live births and 6,000 abortions. The abortion rates 9.0 and 6.0, respectively, per 1,000 population, when the abortion ratios are 200 and 400, respectively, 1,000 live births. Thus, the country with the hig abortion rate has the lower abortion ratio, and v

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[1] H. J. Osofsky and J. D. Osofsky, eds., *The Abortion Experience Psychological and Medical Impact* (Hagerstown, Md., Harper and Row, 1973), C. Tietze and D. A. Dawson, *Induced abortion, a factbook*, Reports on Population Family Planning, No. 14 (New York, The Population Council, 1973).

[2] H. P. David, M. G. Kalis and C. Tietze, *Selected Abor Statutes: An International Summary* (Silver Spring, M American Institutes for Research/Transnational Family search Institute, 1973).

[3] *Family Planning in Hungary: Main Results of the I Fertility and Family Planning (TCS) Study* (Budapest, De graphic Research Institute, 1970).

[4] *Spontaneous and Induced Abortion*, World Health Or zation Technical Report Series No. 461 (

versa. From this example, it can also be inferred that a given abortion rate corresponds to a higher abortion ratio when the birth rate is low rather than when the birth rate is high.

Abortion and contraception

9. Because induced abortion and contraception serve a common objective—the prevention of unwanted births—a high positive correlation between abortion experience and contraceptive practice can be expected in populations in which some couples attempt to regulate the number and spacing of their children while others do not set any bounds to their reproductive capacity. In such populations, women who use contraception have higher abortion rates and ratios than the non-contraceptors. This apparent paradox is resolved if the comparison is limited to a population in which all couples are determined to avoid or to defer childbirth, but not all of whom practice contraception. In such a population, the abortion ratio will be very high because most unwanted pregnancies will be aborted. However, couples practing contraception consistently and effectively experience fewer unwanted pregnancies and, therefore, a lower abortion rate than those who use contraception ineffectively or not at all.

10. Another aspect of the relationship between abortion and contraception concerns the question as to how many abortions are required to replace one birth. In reference to a given pregnancy, the answer is of course "one", since a pregnancy can be terminated only once, but the answer is different when one considers either the life of a woman over a period of years or an entire population.

11. The interval between two successive conceptions can be divided into three components: the pregnancy itself; an anovulatory period following the pregnancy during which conception cannot occur; and an ovulatory period during which the monthly probability of conception is more than zero but less than one.

12. Induced abortion reduces the first two components because the duration of pregnancy is shortened from about nine months for a birth to about three months for an abortion. The subsequent anovulatory period is also shortened following an abortion compared with that following a birth, the magnitude of the difference depending upon the duration of breast-feeding. The average time required for conception during the ovulatory period is presumably not affected. With breast-feeding of moderate to long duration and without contraception, the second component is long in relation to the third, with the net effect that at least two abortions are required to avert one live birth. If contraception is practiced widely with even moderate effectiveness, the third component is extended in relation to the others, with the result that only slightly more than one abortion is required to avert one birth.[5]

Thus, it can be concluded that abortion alone is an inefficient method of fertility regulation and that it becomes progressively more efficient as the expanding use of contraception relegates its role to a backstop measure.

Abortion policies and medical attitudes

13. Almost one half of the world's people live in countries where abortion is either illegal in any circumstances or legal only to preserve the life of the pregnant woman. In more than 40 countries, the laws permit abortion on medical indications to preserve the woman's health, one half of which also recognize eugenic indications (genetic defects and/or intra-uterine damage to the foetus) and/or juridical indications (rape, incest etc.). In seven countries, termination of pregnancy may be authorized on social-medical grounds, i.e., to avoid a threat to the health of the woman (or, in the United Kingdom of Great Britain and Northern Ireland, to any existing children of her family), with a further provision that social factors may be given consideration when the threat to health is evaluated. Purely social indications, without reference to health, are accepted in six additional countries. Ten countries permit elective abortion, also referred to as abortion on request, either for all women (six countries) or for certain categories of women, defined in terms of age and/or parity (four countries). In most countries where abortion on request is permitted, it is limited to the first trimester of pregnancy and a medical indication is required thereafter.[6]

14. In many countries, the abortion laws are not strictly enforced, and in most countries, some abortions on medical grounds appear to be tolerated. In some countries with very restrictive laws, abortions can readily be obtained from physicians, without interference from the authorities. On the other hand, a liberal abortion law may not be implemented throughout a country, with the result that services are not available to many women seeking abortion.

15. Traditionally, physicians see themselves as the "guardians of life" and abortion as the destruction of life and, hence, incompatible with their proper function and with the hallowed Hippocratic Oath. In the past, many physicians considered abortion permissible only in those situations where continuation of the pregnancy constituted a serious threat to the woman's life which could not be averted in any other way. This attitude is still held by many physicians throughout the world and is the official position of the medical profession in many countries. However, some physicians in most countries and many physicians in some countries have come to accept a spectrum of indications for the termination

[5] Abortion laws: a survey of current world legislation", *International Digest of Health Legislation*, vol. 21, No. 3 (1970), pp. 437-512.

[6] H. P. David, Z. Alam and M. G. Kalis, *Abortion Legislation: A Summary International Classification* (Silver Spring, Md., American Institutes for Research/Transnational Family Research Institute, 1972); "Abortion laws: a survey of current world legislation", *loc. cit.*

of pregnancy, ranging from a liberally interpreted medical indication, i.e., to avert deterioration of the woman's physical and/or mental health, rather than as a threat to her survival, and to social and humanitarian indications, including multiparity, rape and other situations of stress, especially if such indications can be defined in objective terms, rather than as the woman's subjective perception of her situation.

Incidence of abortion

16 Many scholars and other observers in the field have stated that induced abortion, in spite of strong condemnation by church, State and the medical profession, is, and has been for centuries, one of the most widely used methods of fertility regulation throughout the world While this assessment cannot be established statistically, millions of women undoubtedly obtain abortions, legally or illegally each year, at their own initiative and, sometimes, at a substantial cost and/or risk to life and health. These women may be rich or poor, college-educated or illiterate, married or single, and of the most diverse ethnic, cultural and religious backgrounds.

17. In the United States of America, according to the National Fertility Study of 1970, almost 8 million unwanted or mistimed births occurred during the five years 1966-1970. During the same period, an estimated 5 million pregnancies were terminated by induced abortion, most of them illegally. It would appear then that abortion was the preferred solution for two fifths of the women having unplanned pregnancies

18. Table 1 presents available data on the numbers of legal abortions, abortion rates per 1,000 women 15-44 years of age, and abortion ratios per 1,000 live births for selected areas during the period 1968-1972 The table does not include China and the Union of Soviet Socialist Republics Fragmentary reports from the USSR suggest that the abortion rate and ratio in that country are higher than any of those shown in table 1.

19 As shown in table 1, numbers, rates and ratios of legal abortion increased rapidly in recent years in those countries where abortion laws have recently been liberalized, such as the United Kingdom and the United States, as they did in Sweden where the procedure has become more easily available without new legislation. In certain other countries, which have had a liberal abortion policy of many years, notably in Czechoslovakia, Hungary, Japan and Poland, numbers, rates and ratios remained stable or declined. (According to some Japanese scholars, the reporting of legal abortions in Japan is seriously incomplete [7] However, there is no evidence that reporting deteriorated from 1968 to 1971.)

[7] M. Muramatsu, "Incidence of abortion in Japan: analyses and results", in International Union for the Scientific Study of Population, *International Population Conference, Liège, 27 August-1 September 1973* (Liège, 1973), vol 2, pp. 319-331.

Table 1. Number of legal abortions, abortion rates and abortion ratios selected areas, 1968-1972 [a]

Area and year	*Number of abortions*	*Abortion rate per 1,000 women, 15-44*	*Abortion ratio per 1,000 live births* [b]
Bulgaria			
1968	91,200	48.1	641
1969	108,100	57.1	767
1970	120,900	64.0	882
1971	132,500	70.2	992
Canada			
1970	11,200	2.6	30
1971	30 900	6 6	83
1972	38,900	8.2	113
Czechoslovakia			
1968	99,000	32.4	456
1969	102,800	33.1	457
1970	99,800	32 3	427
1971	97,300	31.4	398
1972	91,300	29.5	357
Denmark [c]			
1969/70	7,500	7.6	106
1970/71	10,000	10 0	134
1971/72	11,500	11.5	152
Finland			
1968	6,300	6 0	90
1969	8,200	7 8	124
1970	14,800	13.8	241
1971	20,400	18 9	337
Hungary [d]			
1968	201,100	88 8	1,311
1969	206,800	90 6	1,337
1970	192,300	83.5	1,297
1971	187,400	81 3	1,228
1972	179,000	77.5	1,163
Japan			
1968	757,400	29 0	397
1969	744,500	28.4	389
1970	732,000	28 0	375
1971	739,700	28 2	364
Norway			
1968	5,200	7.2	75
1969	6,300	8.7	94
1970	7,800	10.7	121
1971	10,200	13 9	186
1972	12,300	16.4	192
Singapore			
1970	2,000	4 3	42
1971	3,300	7 0	69
1972	3,500	7.1	Not available
Sweden			
1968	10,900	7.0	99
1969	13,700	8.8	128
1970	16,100	10 2	143
1971	19,300	12.2	171
1972	24,200	15.2	218
United Kingdom			
England and Wales [e]			
1968	22,300	2.4	27
1969	49,800	5.3	64
1970	76,000	8 1	96
1971	94,600	10 1	126
1972	108,600	11.5	154

TABLE 1 (*continued*)

Area and year	*Number of abortions*	*Abortion rate per 1,000 women, 15-44*	*Abortion ratio per 1,000 live births*[b]
Scotland			
1968	1,500	1.5	17
1969	3,500	3.6	40
1970	5,300	5.3	60
1971	6,300	6.2	75
1972	7,600	7.5	Not available
United States of America[f]			
1970	193,500	4.5	52
1971	485,800	11.2	143
1972	586,800	13.2	184
California[c, e]			
1968/69	7,800	1.9	22
1969/70	33,800	7.9	93
1970/71	84,900	19.4	257
1971/72	113,000	25.3	369
New York City			
1970/71	67,400	39.4	511
1971/72	75,100	43.4	650
1972/73	78,900	45.2	703

SOURCES: Canada, Ministry of Industry, Trade and Commerce, *Statistics Canada, Therapeutic Abortions*, published irregularly for 1970 and 1971, annually since 1972; Czechoslovakia, Institute for Health Statistics, *Zdravotnicka Statistika CSSR*, Potraty, published annually since 1964; Denmark, National Health Service, *Medicinalberetning for Kongeriget Danmark*, published annually; Finland, National Board of Health, *Yleinen terveydenja sairaanhoito*, published annually; Hungary, Central Statistical Office, *A Vetelesek Adatai 1971* (Budapest, 1973); Japan, Ministry of Health and Welfare, *Yu Sei Ho Go To Kei Ho Koku*, published annually; A. Klinger, "Report on the legislation, practices and statistics about induced abortion in the European socialist countries", presented at International Union for the Scientific Study of Population Workshop on Abortion Research, Chapel Hill, N.C., 19-23 March 1973; *Yearbook of Nordic Statistics* (Stockholm, Nordic Council, published annually); Singapore, Family Planning and Population Board, unpublished data; J. Sklar and B. Berkov, "The effects of legal abortion on legitimate and illegitimate birth rates: the California experience", *Studies in Family Planning*, vol. 4, No. 11, (November 1973), pp. 281-292; Sweden, Department of Justice, *Rätten till abort* (Stockholm, 1965, Ars Abortkommitté, 1971), p. 49; Sweden, National Board of Health and Welfare, *Allmän hälso-och sjukvard*, published annually; C. Tietze, "Two years' experience with a liberal abortion law: its impact on fertility trends in New York City", *Family Planning Perspectives*, vol. 5, No. 1 (1973), pp. 36-41; United Kingdom, Office of Population Censuses and Surveys, *The Registrar General's Statistical Review of England and Wales*, Supplement on Abortion (London, Her Majesty's Stationery Office, published quarterly); United Kingdom, Scottish Home and Health Department, *Health Bulletin*, published monthly; United Nations, *Demographic Yearbook*, published annually; United States of America, Center for Disease Control, *Abortion Surveillance Report—Legal Abortions, United States Annual Summary*, published annually since 1970.

[a] Data for most recent years may be preliminary.
[b] Six months later.
[c] Fiscal years.
[d] Reporting thought to be less than 50 per cent complete.
[e] Residents only.
[f] Reporting for the United States of America as a whole thought to be about 80 per cent complete.

20. As indicated previously, no satisfactory method yet exists for estimating the numbers of illegal abortions. However, a realistic appraisal of what is known about human fecundity, spontaneous foetal loss, sexual and contraceptive behaviour and the efficacy of contraception as actually practised suggests strongly that no country has ever attained a low birth rate (15-20 per 1,000 population) without widespread recourse to induced abortion, legal or illegal. It is likely that rates and ratios of illegal abortions in countries with low birth rates and restrictive abortion laws are on a similar order of magnitude as rates and ratios of legal abortions in countries with comparable birth rates and liberal abortion laws.

21. There is considerable variation in the demographic characteristics of women seeking abortion. From recent statistics on legal abortion in countries with liberal abortion laws, three important indicators of the abortion pattern have been selected—the percentage of women under 20 years of age, the percentage of childless women and the percentage of unmarried women. Table 2 shows that each of these three measures was highest in Sweden, the United Kingdom and the United States of America.

22. In all countries for which statistics are available, the rate of legal abortions has increased more rapidly in recent years among women under 20 years than in any other age group. This apparently worldwide and rapid increase in legal abortions among very young women may reflect earlier maturation, changing patterns of sexual behaviour, growing acceptance of abortion as an alternative to forced motherhood, liberalization of abortion laws and of the attitudes and practices of the medical profession, or a combination of these and other factors.

23. Not unexpectedly, abortion ratios tend to be lowest among married women pregnant for the first time and to increase with increasing parity, although in some countries, the abortion ratio reaches its maximum among women with from two to four prior births, followed by a decline. The decline in abortion ratios at higher parities probably reflects a long-established small family norm because women who reject abortion for religious or other reasons are over-represented among women of high parity. The number of prior births at which the abortion ratio is highest corresponds to the number of children beyond which additional births are unacceptable to a substantial proportion of women.

24. One of the most important factors in the evaluation of morbidity and mortality associated with abortion is the duration of the pregnancy when it is terminated. The division lies between abortions in the first trimester and those in the second trimester, that is, between those performed at 12 weeks' gestation or earlier and those at 13 weeks or later. Although the second trimester extends to about 24 weeks' gestation, few abortions are performed after 20 weeks, even when not prohibited by law.

25. Among the six countries and New York City for which statistics on legal abortions by period of gestation are available for recent years (table 3), the

TABLE 2 PERCENTAGE OF WOMEN UNDER 20 YEARS OF AGE, CHILDLESS WOMEN AND UNMARRIED WOMEN AMONG WOMEN HAVING LEGAL ABORTIONS SELECTED AREAS, LATEST AVAILABLE YEAR

Area and year	*Percentage under 20*	*Percentage childless*	*Percentage unmarried* [a]
Czechoslovakia, 1972	8 7	17.0	24.4
Denmark, 1969	16 6	Not available	39.5
Finland, 1970	11 7	32 4	40 0
Hungary, 1971	9 0	18 6	19.6
Japan, 1971	1 9	Not available	Not available
Singapore, 1972	2 7	1.1	6.5
Sweden, 1972	23 5	41 3	61.6
United Kingdom			
England and Wales, 1972 [b]	22 1	46 2	56.0
Scotland, 1972	22 4	37 2	51 3
United States of America, 1971/72 [c]	24 2	51 0	70 1
California, 1971/72 [b]	32 7	Not available	73.1
New York City, 1971/72 [b]	18 2	43 5	Not available

SOURCES: See table 1 C Tietze and S Lewit, "Joint Program for the Study of Abortion [illegible] in Family Planning, vol 3, [illegible]

[c] Investigation under the Joint Program for the Study of Abortion (see paragraph 43)

TABLE 3 PERCENTAGE DISTRIBUTION OF LEGAL ABORTIONS BY PERIOD OF GESTATION: SELECTED AREAS AND YEARS, 1968-1972

	12 weeks or less	*13 weeks or more*
Czechoslovakia		
1968	99.5	0 5
1972	99 4	0 6
Hungary		
1971	99 5	0 5
Japan [a]		
1968	95 0	5.0
1971	95.9	4.1
Sweden		
1968	43 0	57 0
1972	73 4	26.6
United Kingdom [b]		
England and Wales		
1968	62 0	38 0
1972	79.6	20 4
United States of America		
1971	81.7	18 3
1972	83 5	16.5
New York City [b]		
1970/71	73.2	26 8
1970/72	82 3	17.7

SOURCES See table 1

[a] Gestation reported in months 3 or less, 4 or more.

[b] Residents only

proportions of second-trimester abortions were highest in England and Wales, Sweden and the United States They were lowest in Czechoslovakia and Hungary, where, as elsewhere in Eastern Europe, second-trimester abortions are generally permitted only on medical indication.

26. The percentage of second-trimester abortions declined in all countries for which data are available, most dramatically in Sweden This trend probably reflects a growing awareness among women and among physicians that abortion is less dangerous early in pregnancy than later on and also the increasing availability of abortion services, at least in some countries

27. Abortions in the second trimester occur most [illegible] women of low socio-economic status [illegible] period of gestation and woman's age probably reflects the inexperience of the very young in recognizing the symptoms of pregnancy, their unwillingness to accept the reality of their situation, their hesitation to confide in their parents and their ignorance about where to seek advice and help. Economic considerations and, in many places, regulations prohibiting surgery on minors without parental consent also contribute to delays in obtaining abortions

ABORTION PROCEDURES

28. The methods currently used by physicians for the termination of pregnancy can be grouped under three headings: (*a*) instrumental evacuation by the vaginal route; (*b*) stimulation of uterine contractions, (c) major surgery.[8]

29. Vaginal evacuation is the procedure of choice for the termination of pregnancy in the first trimester. The classical method is customarily referred to as dilatation and curettage (D and C). The procedure involves stretching the cervical canal by the insertion of a series

[8] S Lewit, ed, "Abortion techniques and services", Proceedings of the Conference, New York, N Y., 3-5 June 1971, sponsored by American Medical Women's Association [and others], *Excerpta Medica*, International Congress Series, No 255 (1972).

of metal dilators, each slightly larger than the preceding one. When the canal has been sufficiently enlarged to permit the passage of instruments into the uterine cavity, the contents of the uterus are removed with a small forceps, following which all remaining placental tissue is scraped out with a sharp curette.

30. In recent years, D and C has been progressively replaced by vacuum aspiration or suction. This method involves dilation of the cervix, followed by the insertion into the uterus of a metal or plastic cannula. The cannula, which has a lateral opening near its end, is rotated to dislodge the embryo from the uterine wall and the fragments are then removed by a pump connected to the cannula by a flexible tube. This technique is simpler, quicker and less traumatic than D and C and the average loss of blood is substantially less.[9] Both the D and C and vacuum aspiration procedures are ordinarily carried out under general anaesthesia or under local anaesthesia by paracervical block.

31. During the second trimester of pregnancy, abortion is usually initiated by the stimulation of uterine contractions. In the United States, the preferred procedure involves the replacement of amniotic fluid by hypertonic salt solution. The uterus is tapped by means of a needle through the abdominal wall and the volume of fluid withdrawn is replaced by an equal or larger amount of saline, usually without use of anaesthesia. In general, the foetal heartbeat disappears within less than one hour, labour begins from 12 to 48 hours after the instillation, and the expulsion of foetus and placenta is completed a few hours later. Use of a hypertonic glucose solution in lieu of saline has been discontinued because of the greater risk of infection. In England, a solution of urea is currently being used successfully and appears to be replacing saline. Mechanical, rather than chemical, means are also used to stimulate uterine contractions, notably in Japan. The most recent additions to the armamentarium of stimulation of uterine contractions by intra-amniotic injection are the prostaglandins, applied in either single or repeated doses. The interval from injection to expulsion tends to be shorter with prostaglandins than with hypertonic saline.

32. The two major surgical procedures used for the termination of pregnancy are hysterotomy and hysterectomy. Hysterotomy is, in essence, a caesarean section at any stage of pregnancy before the foetus is viable. The uterus is usually approached by laparotomy, but up to the sixteenth week hysterotomy can also be performed by the vaginal route. Because hysterotomy leaves a scar in the uterine wall, resulting in weakened tissue and possible rupture of the uterus at a later delivery, it is usually combined with tubal sterilization. Hysterectomy is a sterilizing operation involving the removal of the uterus. It is often chosen when the objective is the removal of the uterus because of fibroid tumours, as well as the termination of the pregnancy. Some gynaecologists recommend hysterectomy in lieu of tubal sterilization in order to avoid later complications in an organ they consider non-functional. Hysterotomy and hysterectomy are usually performed under general anaesthesia.

33. Attempts by lay persons to induce abortion, including self-abortion, range from spells and incantations to a variety of ineffective and/or toxic medications, to grossly traumatizing procedures designed to damage or destroy the conceptus, leaving its expulsion to natural forces. The most widely used procedure is probably the insertion of a foreign body into the uterus.

34. National statistics on abortion procedures are available only for England and Wales and the United States of America. Since the late 1960s, the great majority of legal abortions have been accomplished by vaginal evacuation. The statistics for England and Wales show that D and C is preferred to suction, while in the United States, the opposite is true. However, in both countries, the use of suction has increased in relation to D and C.

35. Among methods other than vaginal evacuation, intra-amniotic instillation of hypertonic saline predominates in the United States. In England and Wales, a relatively large proportion of all legal abortions are performed by hysterotomy and the saline method is rarely used.

36. The period of gestation is of primary importance in determining the procedure for the termination of pregnancy. In the United States of America, virtually all first-trimester abortions are performed by vaginal evacuation, in most cases by suction. In England and Wales, a not insignificant, albeit declining, proportion is accomplished by hysterotomy. For abortion in the second trimester, the preferred procedure in the United States is the instillation of hypertonic saline solution, with relatively little use of vaginal evacuation and very little major surgery. In England and Wales, on the other hand, almost one half of all second-trimester abortions in 1968 were done by hysterotomy, declining to less than one fourth by 1971, with a corresponding increase in vaginal evacuation.

37. Legal abortions are performed in hospitals, clinics and doctors' offices or surgeries. The choice of premises and the duration of the hospitalization, if any, are determined by the period of gestation and the type of procedure to be used, applicable laws and regulations, traditions of the medical profession, availability of medical facilities and economic considerations. Recent experience accumulated in the United States and elsewhere has shown that overnight hospitalization is usually not required for uncomplicated first-trimester pregnancy terminations, the large majority of which are now performed in out-patient departments of hospitals or in specialized clinics outside of hospitals.[10]

[9] B. M. Beric and M. Kupresanin, "Vacuum aspiration, using peri-cervical block, for legal abortion as an outpatient procedure up to the 12th week of pregnancy", *Lancet*, vol. 1971 (II) (18 September 1971), pp. 619-620.

[10] American Public Health Association, "AHPA recommended program guide for abortion services", *American Journal of Public Health*, vol. 63, No. 7 (July 1973), pp. 639-644.

In other countries, such as the United Kingdom, doctors and health authorities insist on in-patient care, which may lead to delays and high proportions of second-trimester abortions. Recent experience also shows that first-trimester abortions in women with pre-existing complication, who may or may not have a concurrent sterilization, and all second-trimester abortions should be in-patient procedures in hospitals

COMPLICATIONS

38. Induced abortion, at any period of gestation, exposes the woman to a risk of medical and psychological complications which varies considerably, depending upon the circumstances in which the abortion is performed The severity of complications also varies widely from minor complaints to the occasional fatal outcome

39. Complications can be divided into two major categories—early, i e, within 30 days after the abortion; and late, i e., those occurring more than 30 days after the procedure Early complications may be subdivided into those which are immediate, defined as occurring during or within three hours after the procedure, and those which are delayed, that is, developing later than three hours *post abortum* but still within 30 days.

40. Serious immediate complications are relatively rare when abortions are performed by well-trained operators in a medical environment. Such complications include perforation of the uterus by one of the instruments used in vaginal evacuation, sometimes combined with injury to the intestines or other organs; major haemorrhage; laceration of the cervix; disorders of the central nervous system and/or the kidneys resulting from hypertonic salt solution entering the blood-stream directly or by way of the peritoneal cavity and the untoward effects of general or local anaesthesia

41. The most frequent delayed complications include retention of placental tissue resulting in post-abortal bleeding and pelvic infection which may lead to peritonitis and septicaemia, as well as to thrombophlebitis resulting in pulmonary embolism.

42 Known late complications or sequelae of induced abortion include an increased risk of premature birth and neo-natal mortality and perhaps, also, of spontaneous abortion in the second trimester in subsequent pregnancies, possibly due to a combination of damage to the cervix at the time of dilatation and of placental insufficiency resulting from too vigorous curettage, sensitization of Rh-negative women by red blood cells from a Rh-positive foetus, and endometriosis in the scar tissue following hysterotomy Secondary sterility and ectopic pregnancy can be the late results of pelvic infection, following self-induced abortions or abortions induced by unskilled operators The role of legal abortion in the aetiology of these conditions, and of placenta previa and dysmenorrhea, has not been established, nor is reliable information available on psychological sequelae, if any

43. Some authors, including some psychiatrists, have expressed the view that every abortion is a stressful experience involving major risks to mental health Others have pointed out that most women undergoing abortion continue to lead essentially normal lives and that an adverse psychological reaction to an unwanted child may be far more common and more serious than to having an abortion In a recent report, the World Health Organization Scientific Group on Spontaneous and Induced Abortion stated that there is no doubt that the termination of pregnancy may precipitate a serious psycho-neurotic or even psychotic reaction in a susceptible individual, but pointed out that emotional stress experienced by the woman may be more closely associated with such factors as the circumstances in which the abortion was performed, the period of gestation, the type of operation and the attitudes of the woman's family and of the professionals involved in the abortion [11]

44. The most comprehensive investigation of early medical complications of legal abortion was undertaken in the United States of America under the Joint Program for the Study of Abortion (JPSA) during 1970/71 and involved 73,000 cases [12] It is the only large-scale study that permits an assessment of variables determining levels of morbidity, such as age and parity, socio-economic and health status, period of gestation, operative procedure, concurrent sterilization and other factors

45. Rates of total and major complications, obtained by JPSA, are shown in table 4. Major complications include unintended major surgery, haemorrhage requiring blood transfusions, three or more days of fever and several other categories associated with roughly comparable risks of death, prolonged illness or permanent functional impairment

46. In analysing the complications of abortion, it is necessary to distinguish those directly associated with the termination of pregnancy from those associated with pre-existing disease or with surgical procedures undertaken for other purposes, such as the removal of a uterus because of fibroid tumours or the achievement of permanent sterility. For this reason, complication rates are shown not only for the aggregate of all patients, but for presumably healthy women subject only to the risks associated with the abortion procedure.

47. Complication rates in JPSA were computed separately for total patients and for local patients with follow-up Follow-up was defined as any contact with the woman 10 or more days after the abortion. The complication rates for total patients represent the minimum estimate of the incidence of early complications, and the rates for local patients with follow-up, the maximum estimate.

[11] World Health Organization, *Spontaneous and Induced Abortion, loc cit*

[12] C Tietze and S Lewit, "Joint Program for the Study of Abortion (JPSA): early medical complications of legal abortion", *Studies in Family Planning*, vol 3, No 6 (June 1972), pp 97-122

TABLE 4. UNITED STATES OF AMERICA: TOTAL AND MAJOR COMPLICATIONS PER 100 WOMEN, BY GESTATION, PROCEDURE AND STERILIZATION, FOR TOTAL PATIENTS AND FOR LOCAL PATIENTS WITH FOLLOW-UP, 1970/71

Gestation (weeks), procedure and sterilization	*Total complications*		*Major complications*	
	Total patients	*Local patients with follow-up*	*Total patients*	*Local patients with follow-up*
All patients				
6 or less	5.2	8.9	0.9	2.0
7-8	4.2	6.3	0.4	0.6
9-10	4.8	7.2	0.6	0.9
11-12	6.8	10.0	1.0	1.7
13-14	15.9	19.3	2.1	2.3
15-16	24.0	27.8	2.5	3.1
17-20	24.0	28.9	2.2	3.3
21 or more	23.0	24.5	2.1	3.1
12 or less	5.2	7.8	0.6	1.1
13 or more	22.2	26.1	2.2	3.0
All gestations	9.6	13.1	1.0	1.6
Patients without pre-existing complications or sterilizing operations				
6 or less	4.1	7.0	0.6	1.3
7-8	3.5	5.1	0.3	0.4
9-10	4.1	6.1	0.4	0.6
11-12	5.2	7.2	0.5	0.7
13-14	13.4	16.2	1.2	1.3
15-16	22.3	25.9	1.8	1.9
17-20	22.7	27.1	1.7	2.6
21 or more	21.2	21.6	1.2	1.4
12 or less	4.2	6.2	0.4	0.6
13 or more	20.6	24.0	1.6	2.1
All gestations	8.4	11.1	0.7	1.0
Procedure				
Suction [a b]	4.2	6.1	0.4	0.6
Dilatation and curettage [a b]	6.0	8.2	0.5	0.8
Saline [a b]	23.4	27.2	1.7	2.4
Hysterotomy [a c]	33.4	32.9	6.7	6.9
Hysterectomy [a]	49.9	50.4	14.3	15.6
Suction: [a b]				
6 or less	3.8	6.1	0.6	1.3
7-8	3.4	4.9	0.3	0.3
9-10	3.9	5.7	0.3	0.6
11-12	5.1	7.1	0.5	0.7
13-14	6.9	9.1	0.8	0.8
15 or more	7.9	11.5	1.9	
Saline: [a b]				
14 or less	29.5	31.4	2.5	2.9
15-16	24.4	37.6	1.8	1.9
17-18	24.0	28.2	1.7	2.5
19-20	21.0	25.8	1.8	2.8
21 or more	21.2	21.5	1.4	1.4
Sterilization: [a d]				
Done	14.0	16.9	2.8	3.5
Not Done	4.2	6.1	0.4	0.6

SOURCE: C. Tietze and S. Lewit, "Joint Program for the Study of Abortion (JPSA): early medical complications of legal abortion", *Studies in Family Planning*, vol. 3, No. 6 (June 1972), pp. 97-122.

[a] Patients without pre-existing complications.
[b] Without tubal sterilization.
[c] With tubal sterilization.
[d] Aborted by suction.

48. As shown in table 4, the minimum estimate of the total complication rate, including all reported diagnoses and complaints, was 9.6 per 100 women and 13.1 per 100 local women with follow-up Complication rates during the second trimester of pregnancy were from three to four times as high as comparable rates during the first trimester. The pattern was similar for major complications. The group of presumably healthy women, exposed to the risk of abortion only, consisted almost entirely of women aborted by suction in the first trimester and by saline in the second trimester Compared with all patients, complication rates among these women were lower at each period of gestation.

49 Rates of total and of major complications were lowest for abortions by suction, followed in ascending order by D and C, instillation of hypertonic saline solution, hysterotomy and hysterectomy. With the exception of the earliest abortions, complication rates following suction increased with period of gestation and were more than twice as high at 15 weeks or more than at 7-8 weeks The higher complication rates reported for the earliest abortions are attributed to the use of rigid cannulas for suction procedures during the period covered by JPSA, rather than the flexible models that came into general use after mid-1971 Conversely, complication rates with the saline method tended to decline with increasing duration of pregnancy

50. For women aborted by suction, the risk of post-abortal complications was considerably increased when a tubal sterilization was performed concurrently with the abortion.

51 Rates of total and major complications were much higher for non-private patients than for private patients at each period of gestation, but especially for abortions in the second trimester. The consistently higher complication rates for non-private patients, compared with private patients, may be due in part to their poorer health not reflected in recorded pre-existing conditions, in part to less adequate medical care during the abortion and/or hospitalization; and in part to inadequate after-care in their home environment.

52 In a group of hospitals participating in JPSA for a year, rates of total and major complications following abortion in the first trimester declined by [illegible]

tions during the second trimester, mainly by the saline method, over the one-year period.

Mortality

53. The earliest data on mortality following legal abortion originated in northern Europe, where the first steps towards the liberalization of abortion laws were taken in the 1930s. The longest continuous series, that for Sweden, indicates a dramatic decline in mortality over the past quarter of a century, from 252 per 100,000 legal abortions to 8 per 100,000, as shown in table 5.

54. In eastern Europe, Czechoslovakia and Hungary provide the most reliable national statistics on mortality following legal abortion Levels of mortality in these

Table 5 Number of legal abortions, number of deaths and mortality per 100,000 abortions, selected areas and periods

Area and period	Legal abortions	Number of deaths	Mortality per 100 000 abortions
Canada			
1970-1972	81,000	6	7
Czechoslovakia			
1957-1961	330,400	19	6
1962-1966	400,900	9	2
1967-1970	398,600	9	2
Hungary			
1957-1959	421,400	23	5
1960-1963	669,700	21	3
1964-1967	739,000	9	1
1968-1970	787,600	8	1
Sweden			
1946-1948	10,700	27	252
1949-1953	28,000	27	96
1954-1963	35,200	21	60
1964-1971	87,900	7	8
United Kingdom			
England and Wales[a]			
1968/69	72,100	20	28
1970	76,000	14	18
1971	94,600	11	12
1972	108,600	14	13
United States of America			
1972	586,800	19	3
California			
1968-1971	202,400	11	5
New York City			
1970/71	173,900	10	6
1971/72	228,100	10	4

Sources. California Department of Public Health, Bureau of Maternal and Child Health, "Fifth Annual Report on the Implementation of the California Therapeutic Abortion Act, 1972", Canada, Ministry of Industry, Trade and Commerce, *Statistics Canada*, A Černoch, "Symposium o problemech interrupce a antikoncepce", *Československá Gynekologie*, vol 29, No 8 (1964) pp 593-597, A Černoch and J Tesar, "Umrtí matek do 28 tydne těhotenství v letech 1961-1966", [illegible]

[a] Residents only

countries have been far below those reported from northern Europe, but even these low levels have shown declines in recent years, reaching 2 per 100,000 in Czechoslovakia and 1 per 100,000 in Hungary, for the most recent available period.

55. In England and Wales, mortality associated with legal abortions in 1968-1969 (28 per 100,000) was almost as high as in Sweden in the late 1950s. By 1972, it had declined to 14 per 100,000.

56. In the United States of America, high levels of mortality from legal abortion prevailed during the period of restrictive legislation when a significant proportion of the women undergoing abortion suffered from pre-existing complications which made them poor risks for any type of surgery. In recent years, with abortion more easily avalable in several states, mortality ratios have declined to about 5 per 100,000 in California and in New York City. Preliminary data for the United States as a whole in 1972 suggest a further decline. One of the principal factors responsible for the differences among countries in mortality association with legal abortion is the period of gestation at which pregnancies are terminated. As shown in table 6, mortality was three times higher in England and Wales following second-trimester abortion (31 per 100,000) than after termination in the first trimester (10 per 100,000).[13] The difference was even greater—17 per 100,000 compared with 2—in New York City.[14] The relatively high levels of mortality in Denmark, England and Wales, and Sweden correspond to high proportions of second-trimester abortions, while the much lower levels of mortality in the countries of eastern Europe reflect the predominance of first-trimester abortions in these countries.

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[13] United Kingdom Office of Population Censuses and Surveys, *The Registrar General's Quarterly Return for England and Wales* (London, Her Majesty's Stationery Office).

[14] C. Tietze, J. Pakter and G. S. Berger, "Mortality associated with legal abortion in New York City, 1970/72", *Journal of the American Medical Association,* vol. 225, No. 5 (30 July 1973), pp. 507-509.

TABLE 6. NUMBER OF LEGAL ABORTIONS, NUMBER OF DEATHS AND MORTALITY PER 100,000 ABORTIONS, BY PERIOD OF GESTATION AND BY PROCEDURE: ENGLAND AND WALES, 1970/71; AND NEW YORK CITY, 1970-1972 [a]

Area, gestation and procedure	*Legal abortions*	*Number of deaths*	*Mortality per 100,000*
England and Wales [b]			
12 weeks or less	122,900	12	10
13 weeks or more	46,600	13	31
Hysterectomy	2,100	4	190
Abdominal hysterotomy	23,100	8	35
Suction	75,500	6	8
Dilatation and curettage	61,700	2	3
Other vaginal procedures	7,700	5	* [c]
New York City [d]			
12 weeks or less	321,500	6	2
13 weeks or more	80,500	14	17
Hysterotomy	2,400	5	208
Saline	53,300	10	19
Delatation and curettage	84,600	2	2
Suction	261,700	3	1

[a] Two years ending 30 June 1972.
[b] Residents only.
[c] Vaginal hysterotomy, urea, paste etc. Rate not computed.
[d] Including women aborted in New York City who died elsewhere.

57. Duration of pregnancy is not the only factor determining the level of mortality. The much higher rates for both first- and second-trimester abortions reported from England, compared with New York City, also reflect the large number of hysterotomies and hysterectomies performed in that country.

58. A comparison of maternal mortality from complications of pregnancy, childbirth and the puerperium with mortality following legal abortion shows clearly that the risk to life associated with first-trimester abortion is far smaller than the risk incurred if the pregnancy is permitted to go to term, even in countries where mortality is low. Mortality with abortion in the second trimester is comparable to maternal mortality.

EFFECTS OF POLICY CHANGES

59. The final section of this report deals with the effects of changes in abortion policies on trends in the numbers of legal abortions, illegal abortions, total induced abortions and births. These effects are more readily predicted *a priori* than demonstrated in terms of empirical data. Shifts in abortion policy usually occur in a social climate that generates a broad spectrum of responses. However, in a given situation, it is difficult and often impossible to isolate the responses mediated by changes in abortion policy.

60. The only fully predictable result of change in abortion policy is its effect on the number of legal

abortions. Liberalization of policy is invariably followed by an increase Conversely, adoption of a restrictive policy results in a decline

61. Because of the hazards associated with illegal abortion, one would expect that liberalization of abortion laws and practices would tend to reduce the number of illegal procedures, especially when termination of pregnancy is authorized on broad social and economic indications. In fact, concern about a large number of illegal abortions, with the attendant risk to the life and health of women, is often the primary reason for adopting a more liberal abortion policy. However, because the numbers of illegal abortions either before or after the change of policy are not known, it is difficult to document the effects of liberalization on incidence of illegal abortion. One must rely on such indicators of the frequency of illegal abortions as the number of deaths attributed to abortion or the number of admissions to hospitals for after-care or for the treatment of complications Each of these indicators may be modified by a variety of factors, of which abortion policy is only one. The number of deaths attributed to abortion may decline because of advances in the treatment of complications rather than because of any changes in the number of abortions or in the incidence of complications The number of women admitted to hospitals may fail to decline because of an increase in the tendency to seek hospital care for all types of illnesses, including complications of abortion.

62. Moreover, the validity of the indicators may also be affected by changes in abortion policy More deaths may be attributed to abortion because of controversies surrounding the change in policy, or more women may be willing to seek medical care or admission to hospitals because of changes in the climate of public opinion associated with a more liberal policy. In spite of these uncertainties, three generalizations are possible with regard to the effects of a liberalization of abortion policy.

63. Moderate extension of the indications for abortion involves a comparatively small proportion of pregnancies and, therefore, has little effect on the number of legal abortions

64 Legal abortions at the request of the pregnant woman or on broadly interpreted social indications substantially reduce the frequency of illegal and/or self-induced abortions, as evidenced by rapidly declining numbers of deaths from abortion. In Czechoslovakia and Hungary, where liberal abortion policies were adopted in the 1950s, reported mortality from abortion declined by three quarters and one half, respectively, [illegible] abortion has declined in England and Wales and in New York City, after abortion policy had been liberalized. For New York, it has been estimated that about 70 per cent of the legal abortions involving city residents from mid-1970 to mid-1972 replaced illegal abortions.

65. Illegal and/or self-induced abortions have not disappeared, even in such countries as Hungary, where elective abortions have been available for more than a decade. This stubborn survival of practices detrimental to health probably reflects dissatisfaction with the manner in which the official abortion services are organized, especially with regard to the protection of privacy.

66. While a change to a more liberal abortion policy reduces the number of illegal abortions, a change to a more restrictive policy may increase it. In Romania, for example, the enactment of a restrictive abortion law in 1966 was followed by an increase in deaths due to abortion from 64 in 1965 to 315 in 1970.

67 The greater availability of legal abortions tends to increase the total numbers of induced abortions, because some pregnancies are aborted that otherwise would have been carried to term. However, owing to the decline in illegal abortions, the increment in the total number of induced abortions is smaller, absolutely and relatively, than the increment in the number of legal abortions

68 Adoption of liberal abortion policies has been followed in a number of countries by declines in the birth rate. In some countries, these declines were perceived as contrary to the national interest and led to restrictive abortion legislation It would be simplistic, however, to ascribe declines in birth rates entirely to changes in abortion policy. Levels and trends of birth rates are determined by broad social forces, the response to which is facilitated by a greater availability of abortion. Birth rates would probably have declined in the centrally planned economies of Eastern Europe in the [illegible] widespread or more diligent use of contraception and by more frequent illegal abortions It appears likely, however, that the decline in the birth rate would have been less marked if abortion laws had not been liberalized

69. Restrictive legislation in Romania was followed by a sharp increase in the birth rate from 14.3 per 1,000 population in 1966 to a level of almost 40 per 1,000, computed on an annual basis, in September 1967. By 1971, the birth rate had dropped to 19.6 per 1,000, as the Romanian people discovered, or rediscovered, alternate means of fertility regulation, including illegal abortion.[15]

[15] H P. David and N H. Wright, "Abortion legislation: the Romanian experience", *Studies in Family Planning*, vol 2, No 10 (October 1971), pp 205-210

ABORTO EN AMERICA LATINA: SITUACION EN ALGUNAS CAPITALES LATINOAMERICANAS SEGUN ENCUESTAS DEL CENTRO LATINOAMERICANO DE DEMOGRAFIA

Centro Latinoamericano de Demografía

1. En el año 1967, el Centro Latinoamericano de Demografía (CELADE) inició[1] un Programa de Estudios comparativos sobre Aborto Inducido y Uso de Anticonceptivos en América Latina (PEAL), que abarcó cuatro capitales — Bogotá, Panamá, Lima y Buenos Aires — donde la investigación se desarrolló entre esa fecha y 1969.

2. Posteriormente, y mientras algunos organismos nacionales utilizaban los instrumentos del PEAL para proceder a investigaciones en sus propios países (el Instituto de Seguridad Social de Nicaragua, en Managua, y el Centro Nacional de Familia de Bolivia, en la Paz, Santa Cruz y Cochabamba), CELADE asesoró una encuesta en Asunción y otras cuatro ciudades del Paraguay (FEPA) en el año 1971, la cual tuvo por objetivos, además de conocer la incidencia del aborto, el de hacer el diagnóstico de la situación en lo referente al uso de anticonceptivos — y en particular a la cobertura de los programas de planificación familiar — con fines de evaluación ulterior. Con esta intención, se diseñaron instrumentos que, recogiendo la experiencia del PEAL, permitieron recolectar la información pertinente y analizar los datos en breve lapso de tiempo.

3. Con estas encuestas, y aunque en forma limitada en su profundidad (sin abordar complejos estudios de tipo sociológico, psicológico y de salud pública) y en su extensión geográfica, se dispuso de datos recientes sobre el problema del aborto inducido.

4. Anteriormente, y además de múltiples estudios realizados en hospitales de numerosas ciudades de la región, aplicados a muestras seleccionadas de mujeres con abortos, otros estudios se desarrollaron a nivel de la población en Santiago de Chile[2], en Lima[3] y en diversas ciudades de Colombia[4], entre otros.

5. En el presente trabajo que, además de dar una visión del pasado reciente y estudiar la tendencia del aborto, pretende detectar el efecto de la planificación familiar sobre su incidencia, sólo se usarán datos aportados por las encuestas PEAL en Bogotá (1968), Panamá (1969), Buenos Aires (1969) y Lima (1970)[5], así como los de la encuesta FEPA en Asunción (1971)[6].

6. Por razones de espacio se presentarán únicamente medidas relativas. Las cifras absolutas que generaron esas medidas aparecen en los trabajos de CELADE citados, y son las fuentes de todos los cuadros que aparecen en las páginas siguientes.

7. En las medidas que se presentan a continuación figuran en los numeradores los abortos totales, esto es, los espontáneos y los inducidos, y no aparecen los abortos inducidos o los espontáneos por separado. Ahora se verá por qué.

8. La experiencia de las investigaciones de CELADE, previas a los estudios del aborto mencionados, muestra en primer lugar que no se puede esperar que todas las mujeres declaren en una entrevista los abortos inducidos que tuvieron. En segundo lugar, se ha constatado que las mujeres interrogadas tienen una fuerte tendencia a declarar como abortos espontáneos los que fueron en realidad provocados. Esto es más frecuente en la medida que la "situación" hace temer una sanción social y penal. Es preferible en esta circunstancia — que es la imperante aunque con fuertes variaciones en toda Latinoamérica — preguntar por "pérdida", que suele tener una connotación espontánea e inevitable, para lo cual no existe reprobación alguna. En las "pérdidas" quedan englobados todos los abortos, los espontáneos y los inducidos.

9. Para poder apreciar la incidencia del aborto inducido, se fija arbitrariamente el porcentaje de embarazos que terminan en abortos espontáneos y se aplica

[1] Con la colaboración de las siguientes instituciones nacionales: la Asociación Colombiana de Facultades de Medicina (ASCOFAME); la Cátedra de Obstetricia y Ginecología de la Facultad de Medicina de Panamá; el Centro de Población y Desarrollo del Perú; el Ministerio de Salud Pública de Argentina; y el aporte financiero del Population Council, tanto a CELADE como a los países.

[2] R. Armijo y T. Monreal, "Epidemiología del aborto provocado en la Ciudad de Santiago", *Revista Chilena de Ginecología y Obstetricia,* No. 7 (1964); M. Requena, "Estudio sobre la planificación de la familia en la Comuna de Quinta Normal de Santiago de Chile", *Milbank Memorial Fund Quarterly,* vol. XLIII, parte 2 (1965), págs. 66 a 94; T. Monreal y R. Armijo, "Evaluación del programa de prevención del aborto provocado en Santiago", *Revista Médica de Chile,* vol. 96, No. 9 (septiembre de 1968).

[3] F. Hall, "Planificación de la familia en Lima, Perú", *Milbank Memorial Fund Quarterly,* vol. XLIII, parte 2 (1965).

[4] B. Lara, N. Lenis y G. Llanos, "Estudio sobre aborto en Cali, Candelaria, Manizales y Popayán, Colombia, 1966", *Primer Laboratorio Nacional de Planificación Familiar,* Popayán, Colombia, 1966.

[5] S. Gaslonde, "Análisis preliminar de algunos datos sobre abortos provenientes de encuestas en América Latina", Centro Latinoamericano de Demografía, Serie A, No. 118, Santiago, 1973.

[6] S. Gaslonde y E. Carrasco, "Una encuesta para evaluar la eficacia de los programas de planificación familiar", Centro Latinoamericano de Demografía, Serie A, No. 119, Santiago, 1973.

ese porcentaje al número observado de embarazos (suma de nacidos vivos, nacidos muertos y pérdidas) para conseguir el número de abortos espontáneos.

10. Luego se resta ese número de abortos espontáneos al número observado de abortos totales (pérdidas) y se obtiene así el número de abortos inducidos que figurará en la respectiva tasa.

11 El porcentaje de embarazos que terminan en abortos espontáneos varía según los autores. La División de Población de las Naciones Unidas, recogiendo la opinión de varios investigadores, lo fijaba en un 10 por ciento en una publicación del año 1954 [7]. Más tarde, la Organización Mundial de la Salud [8] consideraba bajo ese porcentaje y lo estimaba entre 15 y 20 por ciento de los embarazos En Hawai [9], se estima en 22 por ciento, añadiendo que la mitad de los abortos espontáneos aparece entre la quinta y la octava semana Otros autores dan porcentajes más moderados, entre 8 y 16 por ciento, advirtiendo que aumentan en la medida que se considera mujeres con abortos previos.

12. Ningún trabajo — a conocimiento del que escribe — estudia ese tópico en Latinoamérica Se puede adelantar, sin embargo, que haciendo abstracción de los abortos espontáneos de las primeras semanas, los "microabortos" que las mujeres no declaran, los porcentajes parecen ser bajos Entre las mujeres indígenas, en particular, sería bajísimo. Un estudio entre las mujeres mapuches de Chile [10], realizado recientemente con muestras de mujeres que viven en su comunidad indígena y mapuches que viven en Santiago de Chile, arroja los porcentajes siguientes: abortos espontáneos por embarazos, 4,7 por ciento, y abortos inducidos, 0,4 por ciento, para un porcentaje de abortos totales en embarazos de 5,1 por ciento [11]. Otra investigación en La Paz, mencionada más arriba y aún inédita, constata bajísimos porcentajes de pérdidas entre las mujeres indígenas oriundas del Altiplano

13 En las encuestas mencionadas de CELADE se fija el porcentaje de muerte fetal involuntaria (abortos espontáneos y mortinatos) en 10 por ciento. A sabiendas que varía seguramente de país a país y, en cada país o localidad, según el nivel socioeconómico de las mujeres, en particular según su estado nutricional Mientras no se disponga de estudios especializados que aporten luz sobre el tópico, se mantiene ese porcentaje de 10 susceptible de ser modificado.

14. En última instancia, el fijar ese porcentaje a un nivel u otro no tendrá mayor importancia cuando se trata de comparar dos situaciones en el mismo lugar y en años diferentes, si se usa el mismo porcentaje en los dos casos, reduciéndose o anulándose así el posible error metodológico

Resumen del pasado en diversas capitales latinoamericanas

15 Para el estudio del pasado, se usan las medidas.

Porcentaje de abortos (A) por embarazos (E) ($\frac{A}{E} \cdot 100$)

Número medio de abortos por mujer (NF)

que se expresará también en porcentaje ($\frac{A}{NF}$ 100)

por mayor comodidad de interpretación

Ambos se refieren a todos los abortos tenidos, tanto los espontáneos como los inducidos, desde el inicio de la vida reproductiva de la mujer hasta el día de la encuesta.

16 Se presentan los datos para observar diferencias en la práctica del aborto según· *a*) niveles de instrucción, *b*) niveles socioeconómicos, *c*) niveles de rapidez.

17. La edad de la mujer influye poco — como se verá — en las variaciones del porcentaje de abortos por embarazos ($\frac{A}{E}$ 100), pero sí influye en la medida de abortos por 100 mujeres ($\frac{A}{NF}$ 100), pues tiene, hasta cierto punto, un efecto acumulativo Con la edad aumenta normalmente el tiempo de exposición al riesgo de embarazarse y, por consiguiente, de abortar. Los mayores porcentajes de abortos por mujeres habrán de verse en los grupos de edades más avanzados Esto es bastante evidente en la probabilidad de haber tenido abortos espontáneos, pero no es tan obvio en la parte correspondiente a los abortos inducidos cuando esa práctica comenzó a intensificarse desde hace poco tiempo en el lugar y aún no tiene efecto acumulativo

18. El estado conyugal permite observar grandes divergencias en las medidas del aborto.

19. El porcentaje de abortos por embarazos es netamente mayor en la categoría de solteras que para las otras categorías, las de casadas-convivientes, y las "otras" (las viudas, separadas y divorciadas), para quienes se contempla todo el pasado, el de su vida marital y, eventualmente, el de su vida sexual después de la separación o viudez.

20. La medida de abortos por mujeres, por el contrario, es mucho mayor en la categoría de casadas-convivientes que para la categoría de solteras. Esta constatación, como la anterior, es válida en todas las capitales, en todas las edades, y cualquiera que sea la

[7] *Foetal and Early Childhood Mortality*, vol I, *The Statistics* (publicación de las Naciones Unidas, No de venta 1954 IV.7), págs. 14 y 15

[illegible]

lo dicho más arriba

variable (nivel de educación, estrato social, etc.) estudiada.

21. Es evidente que las solteras tienen un riesgo mayor de abortar que las casadas cuando se embarazan (y este riesgo lo mide el porcentaje $\frac{A}{E} \cdot 100$). Pero como su riesgo de embarazarse es mucho menor, la incidencia del aborto (medido por el porcentaje $\frac{A}{NF} \cdot 100$), que viene a ser el producto de los dos riesgos, resulta menor para las solteras que para las casadas. Los cuadros 1 y 2 permiten comprobarlo.

22. Las categorías contempladas al estudiar diferenciales en la práctica del aborto según niveles de educación y por estratos socioeconómicos no tienen la misma estructura por edades y estado conyugal. Existen diferencias a veces considerables. El caso más elocuente es el de la categoría "analfabetas"[12] en las que predominan las convivientes de edades altas (con historial cargado de hijos y abortos), a la inversa de lo que sucede en la categoría "universitaria".

23. Por estas razones los diferenciales para la medida abortos por mujer según niveles de educación y estratos socioeconómicos se examinarán, además, con la consiguiente tipificación por edad y estado conyugal. Pues si bien las diferencias observadas entre categorías corresponden a la realidad imperante en cada ciudad del estudio, el comportamiento de las mujeres de las diversas categorías, en igualdad de condiciones (de edad, de estado conyugal) puede no ser tan diferente como lo muestran las medidas observadas, lo que se comprobará más adelante.

[12] No estudiada aquí por el escaso número de observaciones en cada ciudad que en el mejor (en el peor, mejor dicho) de los casos no sobrepasa un 5 por ciento de la muestra, y no permite tipificación alguna.

Medidas del aborto según niveles de instrucción

24. Según niveles de instrucción, el cuadro 1 muestra, para la medida abortos por embarazos, diferenciales en cada grupo de edades y en cada ciudad. Estos diferenciales son a veces poco o nada significantes y cuando lo son, tienen sentido diferente en cada ciudad y no permiten conclusiones válidas para el conjunto. En Lima, en el grupo 20-34 años, la probabilidad de abortar en caso de embarazo es mayor en el nivel primario, y en el grupo 35-49 años, lo es en el nivel universitario. En Bogotá sucede a la inversa. En Panamá, las mujeres de nivel secundario son las que más abortan cuando se embarazan, en ambos grupos de edades. En Buenos Aires, las del nivel universitario, en todas las edades, presentan medidas más altas, lo cual indicaría que la escala de valores que condiciona la actitud y el comportamiento de la mujer frente al aborto es diferente para el mismo nivel de instrucción en cada ciudad.

25. Las medidas abortos por mujeres de 15 a 49 años son, en cuatro capitales, más altas para las mujeres de nivel primario, y las más bajas para las de nivel universitario. En Buenos Aires el mayor porcentaje de abortos por mujeres se observa en el nivel universitario (cuadro 3).

26. La tipificación de las medidas, tomando como base la estructura por edades y estado conyugal de la muestra en cada capital[13], no cambia los rasgos de los

[13] Se trata de tipificar para comparar diferentes niveles de educación en cada ciudad, es decir, de comparaciones "intraencuestas". Si se tratara de comparar el mismo nivel de educación en las diferentes ciudades, comparaciones "extraencuestas", la estructura tipo sería la estructura total de todas las muestras, obviamente.

CUADRO 1. MEDIDAS: ABORTOS (TOTALES) POR 100 EMBARAZOS ($\frac{A}{E} \cdot 100$) Y ABORTOS (TOTALES) POR 100 MUJERES ($\frac{A}{NF} \cdot 100$) POR GRANDES GRUPOS DE EDADES Y NIVELES DE INSTRUCCIÓN EN DIVERSAS CAPITALES LATINOAMERICANAS

Medida y nivel de instrucción	*Bogotá*		*Lima*		*Panamá*		*Asunción*		*Buenos Aires*	
	20-34	*35-49*	*20-34*	*35-49*	*20-34*	*35-49*	*20-34*	*35-49*	*20-34*	*35-49*
$\frac{A}{E} \cdot 100$)										
Nivel primario	9,4	10,6	10,4	8,5	10,2	11,8	15,3	12,3	18,2	18,3
Nivel secundario	9,9	11,2	8,9	13,5	17,2	13,9	16,1	10,2	15,8	20,6
Nivel universitario	11,7	7,3	6,4	16,8	14,4	9,8	11,6	17,2	31,9	29,2
$\frac{A}{NF} \cdot 100$										
Nivel primario	26,2	55,5	30,1	45,6	30,3	58,9	32,3	61,9	25,2	47,8
Nivel secundario	21,4	54,5	14,3	52,9	32,8	51,0	26,7	60,0	17,5	61,1
Nivel universitario	10,1	26,7	4,7	40,9	18,0	28,6	10,4	50,0	28,2	90,5

NOTAS: 1. Para el grupo de edades 15-19 años, el número de observaciones es insuficiente para tener valores estadísticos. Los valores de la medida $\frac{A}{E} \cdot 100$ son sin embargo, los más altos de los observados por grupos de edades (entre 18,5 y 42,8 por ciento), salvo en Bogotá.

2. No se incluyen las analfabetas por ser escasas en las muestras (menos del 5 por ciento de las mujeres).

Cuadro 2 Medidas abortos por 100 embarazos ($\frac{A}{E} \cdot 100$) y abortos por 100 mujeres ($\frac{A}{NF} \cdot 100$) según estado civil y niveles de instrucción, en diversas capitales latinoamericanas

Medidas y ciudades	*Primario*			*Secundario*			*Universitario*		
	Solteras	*Casadas*	*Otras*	*Solteras*	*Casadas*	*Otras*	*Solteras*	*Casadas*	*Otras*
$\frac{A}{E}$ 100									
Bogotá	—	9,9	10,7	33,3	10,5	14,7	—	9,7	—
Lima	18,2	9,7	6,0	—	11,8	10,2	—	11,0	11,1
Panamá	26,3	11,3	11,1	72,2	15,4	12,4	57,1	11,5	10,8
Asunción	28,3	12,2	15,6	23,5	18,1	5,0	—	14,5	—
Buenos Aires	63,6	18,1	17,4	20,0	18,4	32,6	100,0	27,8	—
$\frac{A}{NF} \cdot 100$									
Bogotá	—	41,3	43,4	0,3	40,4	44,1	—	25,3	—
Lima	1,8	47,6	20,9	—	40,4	40,7	—	28,2	28,6
Panamá	4,2	54,4	35,8	4,8	44,7	37,7	3,8	29,6	22,2
Asunción	18,4	48,2	52,8	2,4	55,9	15,4	—	41,7	—
Buenos Aires	4,7	45,7	38,7	0,5	47,4	100,0	10,4	76,6	—

Nota: En "casadas", se incluyen casadas y convivientes En "otras", a las viudas, divorciadas y separadas

niveles de instrucción. Se deprimen las medidas del nivel primario, en todas las ciudades, y se incrementan las del nivel universitario Ocurre lo mismo que cuando se tipifica la medida "promedio de hijos por mujer" en el estudio de la fecundidad diferencial por niveles de instrucción a consecuencia de estructuras muy diferentes En el nivel primario, en efecto, el peso relativo de los grupos de mayor edad suele ser superior al peso de esos grupos en los otros niveles, y también es superior al porcentaje de uniones consensuales y de uniones inestables — precisamente las categorías que suelen tener más hijos y más abortos

Cuadro 3. Abortos por 100 mujeres ($\frac{A}{NF} \cdot 100$) medidas observadas y medidas tipificadas en mujeres de 15 a 49 años y según niveles de instrucción, en diversas capitales latinoamericanas

Niveles de instrucción	*Bogotá*		*Lima*		*Panamá*		*Asunción*		*Buenos Aires*	
	Medida observada	*Medida tipificada*	*Medida observada*	*Medida tipificada*	*Medida observada*	*Medida tipificada*	*Medida observada*	*Medida tipificada*	*Medida observada*	*Medida tipificada*
Primario	30,9	28,9	33,5	27,9	35,9	31,9	37	36	36,1	31,4
Secundario	27,2	25,2	21,5	23,2	29,6	31,3	27	31	29,6	35,7
Universitario	10,8	17,8	12,6	17,8	20,4	20,5	16	20	42,7	64,4

Medidas del aborto según estratos socioeconómicos

27. El nivel socioeconómico especificado por la ocupación del jefe del hogar[14] no discrimina diferenciales muy marcados en lo que concierne a la medida de abortos por embarazos (ver cuadro 4), salvo en Panamá, donde es significativamente superior en las *mujeres jóvenes del estrato medio, y en Buenos Aires*, para las mujeres del estrato alto.

28 En cuanto al porcentaje de abortos por mujeres, la situación varía según la capital y el grupo de edades observados, sin permitir generalizaciones

29. La tipificación de la medida abortos por mujeres de los estratos socioeconómicos no cambia substancialmente, como puede observarse en el cuadro 5, las medidas observadas, pues la estructura comparada de esos estratos es menos dispar que la estructura de los niveles de educación.

30 El efecto diferencial por niveles de educación parece ser mayor que por estrato socioeconómico[15], en

ocupaciones caracterizadas por requerir preparación universitaria o equivalente, las actividades artísticas, gerenciales, etc. En el estrato medio, las ocupaciones no universitarias predominantemente no manuales como las de agentes, corredores, vendedores, oficinistas, mecánicos de precisión, etc En el estrato bajo, las ocupaciones manuales no especializadas

[15] Al parecer, la mujer actúa de acuerdo a su propia escala de valores, influenciada por su nivel de instrucción, de preferencia a la escala de valores del medio socioeconómico donde está ubicada por la profesión u oficio d ri el estrato social)

CUADRO 4. MEDIDAS: ABORTOS POR EMBARAZOS ($\frac{A}{E} \cdot 100$) Y ABORTOS POR MUJERES ($\frac{A}{NF} \cdot 100$) SEGÚN ESTRATOS SOCIOECONÓMICOS Y POR GRANDES GRUPOS DE EDADES, EN CUATRO CAPITALES LATINOAMERICANAS

Medidas y estratos	*Bogotá*		*Lima*		*Panamá*		*Buenos Aires*	
	20-34	*35-49*	*20-34*	*35-49*	*20-34*	*35-49*	*20-34*	*35-49*
$\frac{A}{E} \cdot 100$								
Alto	9,4	10,3	11,4	15,4	12,7	12,4	23,0	23,4
Medio	10,3	12,0	7,9	9,4	20,8	14,0	14,7	17,8
Bajo	10,0	9,7	8,9	7,9	11,8	13,3	18,5	17,8
$\frac{A}{NF} \cdot 100$								
Alto	15,8	46,6	16,2	56,2	80,5	42,6	29,1	80,0
Medio	21,6	61,1	15,2	42,6	33,5	45,1	14,6	43,5
Bajo	26,8	50,6	23,0	45,9	31,2	57,5	23,7	44,6

CUADRO 5. ABORTOS POR 100 MUJERES ($\frac{A}{NF} \cdot 100$): MEDIDAS OBSERVADAS Y MEDIDAS TIPIFICADAS EN MUJERES DE 15 A 49 AÑOS Y SEGÚN ESTRATOS SOCIOECONÓMICOS, EN DIVERSAS CAPITALES LATINOAMERICANAS

Estratos	*Bogotá*		*Lima*		*Panamá*		*Buenos Aires*	
	Medida observada	*Medida tipificada*	*Medida observada*	*Medida tipificada*	*Medida observada*	*Medida tipificada*	*Medida observada*	*Medida tipificada*
Alto	23,6	21,1	28,1	28,2	24,9	20,5	46,3	46,3
Medio	29,1	27,5	22,8	22,4	32,4	33,2	27,6	28,2
Bajo	27,4	28,7	25,5	26,1	31,3	33,4	29,3	30,6

CUADRO 6. EFECTO DIFERENCIAL SEGÚN NIVEL DE INSTRUCCIÓN Y SEGÚN ESTADO SOCIOECONÓMICO EN RELACIÓN AL PORCENTAJE DE ABORTOS POR MUJERES

Efecto diferencial según:	*Bogotá*		*Lima*		*Panamá*		*Buenos Aires*	
	20-34	*35-49*	*20-34*	*35-49*	*20-34*	*35-49*	*20-34*	*35-49*
Nivel de instrucción	2,6	2,1	6,4	1,3	1,8	2,1	1,6	1,9
Estrato socioeconómico	1,7	1,3	1,5	1,3	1,6	1,4	2,0	1,8

NOTA: Las cifras (basadas en los cuadros 1 y 4) indican cuantas veces mayor fue la medida más alta en relación a la medida más baja en cada categoría de nivel de instrucción y estrato socioeconómico. Por ejemplo: en Bogotá, para el grupo de edades 20-34 años, las medidas $\frac{A}{NF} \cdot 100$ fueron 15,8, 21,6 y 26,8 según estratos socioeconómicos. El poder diferencial fue: $\frac{26,8}{15,8} = 1,7$.

lo que a la práctica del aborto se refiere. El cuadro 6 marca un poder discriminatorio mayor por niveles de instrucción en todas las ciudades y grupos de edades, salvo en el grupo 20-34 años de Buenos Aires, donde parece tener mayor influencia el estrato socioeconómico que el nivel de educación.

Medidas del aborto según paridez

31. En este estudio se entiende por paridez el número de nacidos vivos tenidos por la entrevistada, y no el número de nacidos vivos y nacidos muertos tenidos, como propiamente se define la paridez.

32. La medida abortos por embarazos decrece en la medida que aumenta la paridez en todas las ciudades (ver cuadro 7), con fluctuaciones dentro de los límites del azar. Obviamente, a igualdad de exposición al riesgo, las mujeres con menor tendencia al aborto serán las que más nacidos vivos tienen.

33. La medida abortos por mujeres (cuadro 7) aumenta con la paridez como se podía esperar por la correlación directa existente entre la paridez y la edad de la mujer. Ese aumento es a veces muy brusco y sólo se explica por el incremento del aborto inducido a partir de cierta paridez. Por ejemplo: es característico

Cuadro 7 Medidas abortos por embarazos ($\frac{A}{E}$ 100) y abortos por mujeres ($\frac{A}{NF} \cdot 100$) según paridez en cuatro capitales latinoamericanas

Paridez	Bogotá $\frac{A}{E}$	Bogotá $\frac{A}{NF}$	Lima $\frac{A}{E}$	Lima $\frac{A}{NF}$	Panamá $\frac{A}{E}$	Panamá $\frac{A}{NF}$	Buenos Aires $\frac{A}{E}$	Buenos Aires $\frac{A}{NF}$
1	17,4	21,3	19,0	25,9	23,6	32,4	24,0	33,3
2	12,1	27,7	12,8	29,8	14,7	35,5	16,3	39,6
3	9,2	30,7	11,8	40,6	11,7	40,5	23,6	93,5
4	10,8	48,6	9,3	41,7	10,8	49,5	11,1	50,8
5 y más	9,1	66,3	7,8	56,8	9,8	72,2	12,4	87,3

el salto de la medida $\frac{A}{NF}$ 100 en Buenos Aires de 39,5 por ciento a 93,5 por ciento al pasar de paridez 2 a paridez 3, lo que indicaría el deseo de no sobrepasar allí los dos hijos, número óptimo, al parecer, para las parejas porteñas. Y, de hecho, según las encuestas de donde emanan los datos que aquí se presentan, dos de cada tres mujeres que han tenido por lo menos un hijo han alcanzado una paridez de 3 o la han superado en Bogotá y Lima, y sólo una de cada tres mujeres que han tenido un nacido vivo alcanza a tener 3 o más nacidos vivos en Buenos Aires.

34. Para la misma categoría de paridez, se observan más abortos por mujeres en los grupos de edades 35-49 años que en los grupos 20-34 años (con la sola excepción de Panamá, en la categoría de paridez 3-4) como aparece en el cuadro 8, lo cual muestra el papel del aborto para limitar la prole, cuando sobrevienen embarazos no deseados.

Estudio de la tendencia del aborto

35. Para conocer la tendencia del aborto en el pasado en las capitales estudiadas, se utilizan los datos aportados por la historia de embarazos de las entrevistadas, donde quedan consignados todos los acontecimientos (partos y abortos) con sus respectivas fechas de ocurrencia, a partir de los cuales se pueden calcular las tasas de embarazos, de abortos y de fecundidad para los años anteriores y remontarse hasta 35 años antes de la fecha de la encuesta Al retroceder en el tiempo disminuye el número de observaciones a la vez que van desapareciendo grupos de edades[16], por una parte Por otra, va pesando con mayor fuerza el factor memoria a medida que se pregunta por acontecimientos más remotos, y más cuando de abortos se trata. Es bueno, por lo tanto, restringir el estudio al pasado reciente y no remontarse excesivamente hacia atrás (cuadro 9).

Cuadro 8 Abortos por 100 mujeres según paridez y grandes grupos de edades, en cuatro capitales latinoamericanas

Ciudad	Grupos de edades	1	2	3-4	5 y más
Bogotá	20-34	22,3	25,9	35,6	45,2
	35-49	27,3	35,1	46,2	73,0
Lima	20-34	19,4	23,3	32,8	42,7
	35-49	35,1	42,9	48,6	59,6
Panamá	20-34	34,5	27,1	58,8	50,0
	35-49	42,1	49,4	36,7	76,2
Buenos Aires	20-34	19,8	38,6	79,6	60,0
	35-49	49,0	40,4	81,9	90,5

[16] Por ejemplo las tasas de 15 años atrás serían sólo para mujeres de 15 a 34 años, partiendo de los datos proporcionados por las mujeres que tenían entre 30 y 49 años en el momento de la encuesta

Cuadro 9. Tasas de embarazos, de abortos por embarazos, de abortos por mujeres y de fecundidad en el año del estudio (tasas promedio de los 4 años anteriores al del estudio y del período anterior)

Tasas (por mil)	Bogotá 1	Bogotá 2	Bogotá 3	Lima 1	Lima 2	Lima 3	Panamá 1	Panamá 2	Panamá 3	Asunción 1	Asunción 2	Asunción 3	Buenos Aires 1	Buenos Aires 2	Buenos Aires 3
$\frac{E}{NF}$	197	143	119	172	161	142	154	144	138	171	139	148	104	88	99
$\frac{A}{E}$	98	115	147	80	123	227	118	165	192	115	192	283	190	217	188
$\frac{A}{NF}$	19	16	18	14	20	32	18	24	27	20	27	33	20	19	19
$\frac{NV}{NF}$	177	126	101	155	139	109	133	118	108	150	110	114	83	67	79

Simbología E = *embarazos*
A = abortos totales
NF = mujeres
NV = nacidos vivos

1 = años anteriores al último quinquenio
2 = los 4 años anteriores al del estudio
3 = año del estudio

36. En este trabajo se comparan tasas del año del estudio con promedios de las tasas de los cuatro años anteriores al estudio y éstos, a su vez, con los promedios de las tasas del quinquenio anterior al último. A partir de las variaciones porcentuales así obtenidas se calcula la variación promedio anual de las tasas para poder apreciar fácilmente los cambios ocurridos (cuadro 10).

CUADRO 10. VARIACIÓN PROMEDIO ANUAL DE LAS TASAS DE EMBARAZOS, ABORTOS POR EMBARAZOS, ABORTOS POR MUJERES Y FECUNDIDAD EN MUJERES DE 15 A 44 AÑOS, EN DIVERSAS CAPITALES LATINOAMERICANAS

	Bogotá	*Lima*	*Panamá*	*Asunción*	*Buenos Aires*
1. La tasa de embarazos:					
En los 5 años anteriores al último quinquenio	– 1,6	– 0,4	–0,3	–1,1	–0,9
En el último quinquenio . .	– 6,7	– 4,7	–1,7	+2,6	+5,0
2. La tasa de abortos (totales) por embarazos:					
En los 5 años anteriores al último quinquenio . .	+ 1,0	+ 3,2	+2,3	+3,9	+0,8
En el último quinquenio .	+11,1	+33,8	+6,6	+6,4	–5,4
3. La tasa de abortos (totales) por mujeres:					
En los 5 años anteriores al último quinquenio . .	– 0,9	+ 2,5	+2,0	+2,0	–0,3
En el último quinquenio . .	+ 5,0	+24,0	+5,0	+7,4	0,0
4. La tasa de fecundidad:					
En los 5 años anteriores al último quinquenio . .	– 1,7	– 0,6	–0,7	–1,6	–1,1
En el último quinquenio	– 7,9	– 8,6	–3,4	+1,4	+6,9

37. Este cuadro indica, además de la variación promedio anual de otras medidas cuya utilidad aparecerá seguidamente, la variación promedio anual de las tasas de abortos.

38. La tasa de abortos por mujeres se ha incrementado en el último quinquenio en las capitales indicadas, salvo en Buenos Aires, donde no ha sufrido variación. El aumento es importante en Bogotá, Panamá y Asunción, y realmente más aún en Lima, donde un incremento de un 24 por ciento anual indica 120 por ciento de aumento en el quinquenio. La tendencia de esta tasa, la de mayor utilidad en salud pública puesto que indica la incidencia del aborto en la población, no puede dejar de preocupar a las autoridades del sector salud, ya que, además del problema que representa en aquellas capitales, hace sospechar lo que puede estar ocurriendo, aunque en menor grado, en el resto del territorio, o lo que ocurrirá, por obra del efecto de demostración que ejerce la capital sobre las otras ciudades en cada país. Es también lícito pensar que la misma tendencia existe en otras capitales latinoamericanas, salvo tal vez allí donde el fenómeno existe como práctica muy extendida desde antiguo.

39. Cabe destacar que se ha incrementado la tasa de abortos a pesar de la disminución de la tasa de embarazos en Bogotá, Lima y Panamá (ver cuadro 10). Esto es debido al fuerte aumento de la tasa de abortos por embarazos en estas ciudades, que ha compensado con creces la mengua relativa del universo en el que puede ocurrir el aborto, es decir, el de las embarazadas. Es conveniente recalcar que el incremento del aborto es debido al aumento de los abortos provocados o inducidos, pues nada permite suponer un aumento de abortos espontáneos por embarazos en los últimos tiempos. Por el contrario, y entre las causas de abortos espontáneos, han desaparecido o menguado fuertemente algunas de ellas (infecciosas y parasitarias) que antaño tenían considerable importancia.

40. ¿En cuáles grupos de edades se ha incrementado más el aborto? El cuadro 11, donde se desglosa la variación promedio anual que aparece en el cuadro 10, muestra, para la medida abortos por mujeres, una diferencia muy significativa entre grandes grupos de edades.

41. Salvo en el caso de Lima, donde el incremento del aborto es debido a la participación de los grupos de edades más jóvenes (entre 20 y 34 años), en todas las otras ciudades (Bogotá, Panamá, Asunción y Buenos Aires) el incremento se observó exclusivamente en los grupos de mayor edad, entre 35 y 44 años. En esas ciudades, las mujeres jóvenes, por el contrario, han tenido una incidencia decreciente del aborto que, desde luego, no compensa el fuerte aumento observado en los grupos de mujeres de mayor edad. En Panamá, por ejemplo, la variación promedio es negativa en el grupo 20-34 años; la tasa de abortos por mujeres se deprime en un 4,3 por ciento cada año. Pero el fuerte incremento de 43,6 por ciento anual de la tasa en el grupo 35-44 años da como resultante un aumento para

CUADRO 11 VARIACIÓN PROMEDIO ANUAL DE LAS TASAS DE EMBARAZOS, ABORTOS POR EMBARAZOS, ABORTOS POR MUJERES Y FECUNDIDAD, EN MUJERES DE 20 A 44 AÑOS, POR GRANDES GRUPOS DE EDADES, EN DIVERSAS CAPITALES LATINOAMERICANAS

(Porcentaje)

Tasas de	*Bogotá*		*Lima*		*Panamá*		*Asunción*		*Buenos Aires*	
	20 34	*35-44*	*20-34*	*35-44*	*20-34*	*35-44*	*20-34*	*35-44*	*20-34*	*35-44*
Embarazos										
Años anteriores	−1,4	− 2,6	− 0,1	− 1,2	+1,3	− 2,5	−0,9	− 1,0	−0,4	−2,0
Ultimo quinquenio	−9,2	+ 3,4	− 1,4	−16,2	−4,0	+ 8,2	−0,2	− 5,8	+3,1	+9,5
Abortos por embarazos										
Años anteriores	+1,4	− 0,4	+ 2,2	+ 1,0	+2,1	+ 1,1	+3,0	+ 8,9	+0,6	−0,1
Ultimo quinquenio	*+4,5*	*+31,1*	*+39,2*	*+12,4*	*0*	*+27,4*	*−9,8*	*+41,3*	*−7,2*	*−4,2*
Abortos por mujeres										
Años anteriores	−0,4	− 2,9	+ 1,9	− 0,5	+4,0	− 2,1	+1,5	+ 6,5	+0,2	−2,0
Ultimo quinquenio	−4,8	+40,0	+36,8	− 8,0	−4,3	+43,6	−9,2	+27,4	−4,3	+2,7

las mujeres de todas las edades de 24 por ciento en promedio cada año durante el último quinquenio

42. Los abortos por embarazos aumentan también fuertemente en todas las ciudades para el grupo 35-49 *años, salvo en Buenos Aires Incluso* aumenta en Lima, donde la variación promedio anual es negativa en esas mujeres para la tasa abortos por mujeres, porque la fuerte disminución de los embarazos (—16,2 por ciento) no es compensada por el aumento de la tasa de abortos en *embarazos (+12,4 por ciento) El aumento más* notable de la tasa de abortos por embarazos se observa en las mujeres de 35 a 44 años en Asunción, donde la variación anual de +41,3 por ciento indica que se triplica la tasa en 5 años.

43 *Se podría pensar que no es real el importante* aumento de la incidencia del aborto señalado para las cuatro capitales estudiadas, y creer que es tan sólo aparente y debido a las omisiones de los abortos en el pasado, más importantes en la medida que se retrocede en el tiempo

44 Esta sospecha es probablemente válida en lo que atañe a los años que preceden el último quinquenio. Por esta razón no se ha comentado la variación promedio anual existente entre el período anterior al último quinquenio y los cuatro años anteriores a la encuesta, que puede haber sido afectada por la falta de memoria de las entrevistadas.

45 Pero no debe temerse mayormente esta fuente de error cuando se compara a través de la variación promedio anual, los cuatro años anteriores con el año de la encuesta Es poco probable que una mujer olvide algún aborto acaecido en el último quinquenio, a menos que haya tenido muchos de éstos en el lapso de tiempo[17] Por el contrario existiría la tendencia, más acentuada en cuanto la circunstancia (la presión social y legal) es más marcada en contra del aborto, de omitir de preferencia los abortos más recientes, los del último año particularmente, para los cuales la interrogada teme una posible sanción En este caso, que involucra la sinceridad de la entrevistada, la falta de confianza *o de buena fe que deprimiría preferentemente la tasa* del último año provocaría una subvaloración del incremento del aborto en el último quinquenio

46 Otro argumento que se esgrime a veces y tiene que ver con la buena fe en las declaraciones, es el *siguiente en las tasas de los últimos años van figurando* las mujeres más jóvenes, que posiblemente tienen menos inhibiciones en lo referente a la vida sexual y declaran con mayor franqueza los abortos tenidos, que las más "viejas" callarían Este argumento pierde fuerza al constatar — como se ha visto — que ha sido precisamente en el grupo de edades 35-44 años donde el incremento ha sido mayor, con la señalada excepción de Lima En esta última capital, es posible que haya tenido alguna influencia esta contingencia, aunque también es lícito pensar que se ha manifestado entre las mujeres jóvenes y en época reciente el deseo de espaciar o limitar los nacimientos, para lo cual han acudido preferentemente al aborto, mientras las más "viejas" apelaban a las prácticas anticonceptivas. Es bastante sugerente, en efecto, que se hayan deprimido en un 16,2 por ciento las tasas de embarazos en el grupo 35-44 (ver cuadro 11), mientras sólo lo hacían en un 1,4 por ciento en el grupo 20-34, y las variaciones en las tasas de embarazos, si otros fenómenos (tales como la variación en la edad de iniciación de relaciones sexuales, de la nupcialidad, etc) no han cambiado substancialmente en un solo quinquenio, se deben obviamente a variaciones en el uso de anticonceptivos

LA SITUACIÓN EN LAS CAPITALES ESTUDIADAS EN EL AÑO DEL ESTUDIO

47. El nivel de fecundidad observado en un lugar y en un año dado depende de múltiples factores relacionados con: la exposición al riesgo de tener relaciones sexuales; si se tiene relaciones sexuales, la exposición al riesgo de embarazarse; y la exposición al riesgo de parir cuando existe el embarazo.

[17] Que posiblemente no fueron abortos, entonces Entre las [illegible]

de algo que no tiene

48. Para investigar el papel de esos factores, se utilizan los datos aportados por la historia de la vida sexual de las entrevistadas en los doce meses que preceden a la fecha de la encuesta. Esta historia, incluida en los cuestionarios de CELADE con el nombre de "Cuadro de la vida sexual del último año", recolecta los datos necesarios para conocer la influencia relativa de las principales variables que contribuyen a fijar el nivel de la fecundidad observado: ausencia de relaciones sexuales por cualquier causa, práctica de la contracepción, práctica del aborto.

49. En el presente trabajo, que se ciñe exclusivamente al estudio del aborto, no se tomarán en cuenta las variables que condicionan la ausencia de relaciones sexuales, las cuales poco o nada pueden ser cambiadas en un programa de salud pública que pretenda combatir al aborto clandestino. Pero sí habrán de tomarse en cuenta las prácticas anticonceptivas de las mujeres, interrelacionadas — como se verá — con la incidencia del aborto.

50. Se estudiará seguidamente a) el efecto del aborto sobre la fecundidad; y b) el efecto de las prácticas anticonceptivas sobre el aborto.

El efecto del aborto sobre la fecundidad en el año del estudio

51. El cuadro 12 indica el efecto reductor de la mortalidad fetal sobre las tasas de embarazos en las capitales estudiadas. Este efecto reductor se calcula usando las tasas de embarazos y de fecundidad observadas. La tasa de fecundidad f) es inferior a la tasa de embarazos e) en la misma proporción que se incrementan las muertes fetales. El valor r del efecto reductor será: $r = \frac{f}{e} - 1$; para mayor comodidad de interpretación, se expresa en porcentaje: $r = (\frac{f}{e} - 1) \cdot 100$[18].

52. La mortalidad fetal incluye el aborto (mortalidad fetal temprana e intermedia) y la mortinatalidad (mortalidad fetal tardía). El efecto reductor calculado no es, pues, exclusivamente el efecto del aborto.

53. Sin embargo, y dado el hecho que la mortinatalidad es de escasa importancia (varía entre 0,6 y 1,3 por ciento de los embarazos en las ciudades del estudio), el efecto reductor calculado es fundamentalmente el efecto del aborto. Este efecto a su vez se compone del efecto del aborto espontáneo y del efecto del aborto inducido. Para poder evaluar exclusivamente el efecto del aborto inducido, se procede de la manera indicada en la introducción del presente trabajo, o sea, se restan 10 puntos (el 10 por ciento de los embarazos) a los efectos reductores calculados. Por ejemplo, el efecto reductor del aborto inducido en Asunción, según los datos del cuadro 12, sería:

(*a*) En el grupo 20-34 años: 17,3 — 10 = 7,3 por ciento;

(*b*) En el grupo 35-44 años: 50,0 — 10 = 40,0 por ciento.

54. Asimilando con fines prácticos el efecto reductor de la mortalidad fetal al efecto reductor del aborto, el cuadro 12 pone en evidencia, en todas las ciudades,

[18] Este porcentaje corresponde, con signo contrario, al de *muertes fetales por embarazos*. Dado que las muertes fetales (MF) son los embarazos (E) menos los nacidos vivos (NV), o sea, $MF = E - NV$, entonces,

$$\frac{MF}{E} = \frac{E}{E} - \frac{NV}{E} = 1 - \frac{NV}{E}$$

y sustituyendo NV por f y E por e: muertes fetales por embarazos, $\frac{MF}{E} = 1 - \frac{f}{e}$, que viene a ser el valor $r = \frac{f}{e} - 1$, con signo contrario. Las medidas de la mortalidad fetal por embarazos (o sea los efectos reductores) del cuadro 12 discrepan de las correspondientes del cuadro 9, donde aparecen (por mil en vez de por cien) bajo las columnas 3 en cada ciudad, las tasas de abortos por embarazos ($\frac{A}{E}$). Esto es debido a que se trata de períodos diferentes: en el cuadro 9 figura el último año calendario, en el cuadro 12 los doce meses antes de la encuesta. Por ejemplo, para Asunción, el último año calendario fue 1970, y el último año fue de julio de 1970 a junio de 1971.

CUADRO 12. EFECTO REDUCTOR DE LA MORTALIDAD FETAL EN EL AÑO DEL ESTUDIO, POR GRANDES GRUPOS DE EDADES, EN DIVERSAS CAPITALES LATINOAMERICANAS

Capitales	*Grupos de edades*	*Tasas de embarazos*	*Tasas de fecundidad*	*Efecto reductor de la mortalidad fetal (en porcentaje)*
Bogotá	20-34	161	139	—13,7
	35-44	*76*	*55*	*—27,6*
	15-49	110	93	—15,4
Lima	20-34	224	175	—21,9
	35-44	*63*	*47*	*—35,4*
	15-49	134	103	—23,1
Panamá	20-34	204	165	—19,1
	35-44	*53*	*26*	*—50,9*
	15-49	129	100	—22,5
Asunción	20-34	225	186	—17,3
	35-44	*46*	*23*	*—50,0*
	15-49	141	105	—25,5
Buenos Aires	20-34	153	127	—17,0
	35-44	*52*	*35*	*—32,7*
	15-49	86	69	—19,8

que ha sido mayor en el grupo 35-44 años que para el grupo de mujeres de 20 a 34 años[19]. En algunas capitales — Panamá, Asunción — la influencia del aborto sobre la fecundidad llega a ser importantísima en aquellas mujeres de 35 a 44 años y su efecto alcanza 40,9 y 40 por ciento respectivamente. En las otras capitales, sin llegar a esas cifras, no deja de ser importante

El efecto de las prácticas anticonceptivas sobre el aborto

55. En los párrafos precedentes se ha señalado el incremento que ha sufrido recientemente la incidencia del aborto en las capitales latinoamericanas estudiadas, salvo en Buenos Aires, donde, según la encuesta allí realizada, no se incrementó, pero alcanza niveles importantes desde antaño.

56 Por otra parte, existen interrelaciones evidentes entre la incidencia del aborto y las prácticas anticonceptivas; se desarrolla una influencia recíproca cuyo sentido es necesario determinar para saber si se puede, o no se puede, contar con las medidas preventivas — las actividades anticonceptivas — para reducir el gran problema de salud pública (entre otros) que representa el aborto clandestino

57. Algunos autores asocian el incremento del aborto al incremento de las actividades anticonceptivas, particularmente a las que desarrollan los programas de planificación familiar. Interpretan la variación concomitante constatada como una relación causal: las actividades de planificación familiar aumentarían la incidencia del aborto. Aportan, para transformar una correlación directa en relación de causa a efecto, unos argumentos subjetivos que no cabe discutir en este trabajo

58. La influencia del uso de los anticonceptivos eficaces[20] sobre la incidencia del aborto sólo puede medirse comparando categorías de mujeres con relaciones sexuales de iguales condiciones (de edad, de fecundabilidad), en las que sólo varía el factor cuya influencia se desea conocer. Y así se procederá seguidamente, con los datos aportados por las encuestas en las capitales latinoamericanas

59. Estos datos permiten comparar lo que ocurrió en el año que precedió la encuesta en las categorías de mujeres que usaron anticonceptivos eficaces, que usaron anticonceptivos menos eficaces (todos los no citados como eficaces), y que no usaron anticonceptivo alguno en sus relaciones sexuales[21]. Para cada categoría se conoce el tiempo real de uso o no uso (medido en "mujer-mes") y los acontecimientos (partos, abortos) que se verificaron durante el año, en cada grupo quinquenal de edades.

60. Para conocer el efecto del uso de anticonceptivo sobre la tasa de abortos y sobre la tasa de fecundidad, no procede comparar categorías de mujeres que usan anticonceptivos con categorías de mujeres que no los usan, pues las mujeres con relaciones sexuales que no usan anticonceptivos, en su conjunto, tienen una probabilidad menor que aquéllas de quedar fecundadas[22]. Y, por lo tanto, el efecto de los anticonceptivos quedaría subestimado.

61. Por el contrario, la comparación entre categorías de mujeres que usan anticonceptivos eficaces, y mujeres que usan anticonceptivos menos eficaces, es válida. Las mujeres que usan anticonceptivos menos eficaces los usan porque se saben expuestas al riesgo de embarazarse, obviamente Si no usan los anticonceptivos eficaces es, o bien porque no los conocen, o porque no tienen acceso a ellos, o porque desconfían de ellos por miedo al daño que presumen les pueda ocasionar, o por escrúpulos religiosos, según las principales razones invocadas por ellas, pero no es porque piensan estar poco expuestas al riesgo de embarazarse. En consecuencia, las dos categorías de mujeres son comparables y las tasas que se observen en cada una de ellas habrán de diferir exclusivamente por el distinto efecto de los anticonceptivos usados

62. Por otra parte, la comparación es, además de válida, oportuna, pues es de suponer con alto grado de seguridad que si las mujeres que usan anticonceptivos (AC) eficaces no pudieran usarlos por cualquier razón, usarían AC menos eficaces y no es lógico pensar que no tomarían ninguna medida anticonceptiva en sus relaciones sexuales. Se puede calcular, entonces, cuáles hubieran sido las tasas si esas mujeres que usaron AC eficaces (en un programa o por su cuenta, durante el año del estudio) hubieran usado AC menos eficaces, y así proceder a la comparación que indicará el efecto del uso de AC eficaces sobre el aborto.

63 Para estimar esas tasas de una situación teórica, se calculan las probabilidades para cada mujer-mes con uso de AC menos eficaces, de tener un hijo nacido vivo y de tener un aborto, en cada grupo quinquenal de mujeres. Se aplican a las mujeres-mes con uso de AC eficaces esas probabilidades que se calcularon para las mujeres-mes con uso de AC menos eficaces, obteniendo así los nacidos vivos esperados y los abortos esperados, si las mujeres de la muestra que usaron AC eficaces hubieran usado AC menos eficaces.

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[19] Aparentemente las cifras para Lima no concuerdan con las del cuadro 11, donde aparece el grupo 20-34 años con el mayor aumento promedio anual Se trata de dos hechos diferentes a pesar de que aumentó más en el grupo "joven" la práctica del aborto en los últimos años, el efecto de esa práctica sobre la fecundidad específica por grupos de edades sigue siendo mayor en el grupo de mujeres más viejas

[20] [illegible] siguientes

[22] Pues si unas cuantas no usan anticonceptivos porque desean tener hijos, otras no los usan porque saben que no están expuestas al riesgo de embarazarse (las estériles) o están poco expuestas, por conocimiento empírico de su "subfecundabilidad". Aún así, las tasas de abortos que presentan esas mujeres son tres a cinco veces superiores a las que tienen las mujeres que usan anticonceptivos (eficaces y menos eficaces) Para demostración de la subfecundabilidad de las mujeres que no usan anticonceptivos, ver S. Gaslonde, *op. cit.*, cap. VI, segunda parte.

64. La diferencia entre nacidos vivos esperados y nacidos vivos observados dará el número de nacidos vivos evitados por el uso de AC eficaces en la muestra de cada ciudad. De la misma manera, se obtendrá el número de abortos evitados.

65. Añadiendo los valores de nacidos vivos y abortos evitados a los numeradores de las correspondientes tasas de fecundidad y abortos por mujeres, se obtienen tasas estimadas que servirán para calibrar el efecto de los AC eficaces en cada ciudad del estudio (cuadro 14).

CUADRO 13. NACIDOS VIVOS Y ABORTOS TOTALES EVITADOS POR EL USO DE ANTICONCEPTIVOS EFICACES POR LAS MUJERES DE 15 A 49 AÑOS DE LAS MUESTRAS DE CUATRO CAPITALES LATINOAMERICANAS

Capitales	*Nacidos vivos*			*Abortos totales*		
	Esperados	*Observados*	*Evitados*	*Esperados*	*Observados*	*Evitados*
Bogotá	18,7	5	13,7	2	2	0
Lima	19,5	11	8,5	4,4	1	3,4
Panamá	65,1	31	34,1	21,3	7	14,3
Asunción	6,4	4	2,4	2,8	0	2,8

Nota: El bajo número de acontecimientos en las mujeres-mes con uso de AC eficaces y AC menos eficaces en Buenos Aires no permitió proceder a los cálculos para esa capital.

CUADRO 14. ESTIMACIONES DE TASAS DE FECUNDIDAD Y DE ABORTOS TOTALES POR MUJERES EN EL SUPUESTO DE QUE LAS MUJERES QUE USARON ANTICONCEPTIVOS EFICACES NO LOS HUBIERAN USADO

Capitales	*Tasas de fecundidad*		*Tasas de abortos totales*	
	Observada	*Estimada*	*Observada*	*Estimada*
Bogotá	93	102,6	16,2	5,2
Lima	103	109,5	30,2	32,8
Panamá	100	124,3	25,3	35,6
Asunción	114,5	115,7	33,3	34,7

Nota: Para Bogotá, Lima y Panamá, las muestras fueron aleatorias pero no autoponderadas, dándole la misma representación a los estratos socioeconómicos alto, medio y bajo. En consecuencia las tasas son aproximadas ya que los estratos bajos quedaron subrepresentados. Al ponderar por estratos, las diferencias hubieran sido ligeramente diferentes.

66. Las variaciones porcentuales entre las tasas estimadas y las tasas observadas dan la medida del efecto de los AC eficaces sobre el aborto. Este efecto aparece en el cuadro 15. Nulo en Bogotá, es apreciable en Asunción, donde la tasa de abortos totales hubiera sido un 4,2 por ciento mayor si las mujeres no hubieran usado AC eficaces, en Lima, donde la tasa hubiera sido un 8,6 por ciento, y llega a ser importantísimo en Panamá, donde los abortos serían un 40,7 por ciento más de los observados si las mujeres no usaran anticonceptivos eficaces.

67. En cuanto a las tasas de abortos inducidos, su incremento hubiera sido aún mayor que las tasas de abortos totales, para alcanzar el 54 por ciento más del observado en Panamá[23].

68. Estos resultados permiten afirmar que no aumentó la incidencia del aborto en las ciudades estudiadas a consecuencia de las actividades de planificación familiar.

69. Por el contrario, las mujeres que usaron anticonceptivos eficaces — entre ellas las usuarias de los programas de planificación familiar —[24] tuvieron menos abortos que las mujeres que usaron anticonceptivos menos eficaces. Ambas categorías reunidas — las mujeres que usaron cualquier tipo de anticonceptivo, eficaz o menos eficaz — tuvieron, como ya se ha dicho, tasas de abortos muy inferiores a las tasas que presentaron en el último año las mujeres que no usaron anticonceptivo alguno en sus relaciones sexuales.

[23] Estos resultados están en relación con el porcentaje de mujeres que usan AC eficaces sobre el total de mujeres en edad fértil, en las ciudades estudiadas: 6,6 por ciento en Asunción, 9 por ciento en Lima y 23,9 por ciento en Panamá.

[24] En Asunción, la proporción de usuarias entre las mujeres que usan AC eficaces fue, el último año del estudio, del 74 por ciento (tres de cuatro mujeres). En las otras ciudades las encuestas no incluían preguntas que proporcionaran este dato.

CUADRO 15. VARIACIONES PORCENTUALES ENTRE TASAS OBSERVADAS Y TASAS ESTIMADAS EN EL SUPUESTO DEL CUADRO 14

	Bogotá	*Lima*	*Panamá*	*Asunción*[a]
Tasas de fecundidad	–10,3	– 6,3	–24,3	–1,0
Tasas de abortos por mujeres	0,0	– 8,6	–40,7	–4,2
Tasas de abortos inducidos por mujeres	0,0	10,7	–54,0	–6,5

[a] Los datos que figuran para Asunción son los de la capital y cuatro ciudades más (Ypacaraí, KaaKupé, Villarrica y Coronel Oviedo). Por lo tanto, la tasa de fecundidad observada difiere de la indicada en el cuadro 12.

70 Es necesario sin embargo hacer notar que, según las mismas encuestas, lo anterior es cierto en lo que a las tasas de abortos por mujeres se refiere, y no lo que es para las tasas de abortos por embarazos, que *suelen ser más altas en las mujeres que no los usan*, lo cual tiene una explicación lógica

71. Tal parece que las prácticas anticonceptivas con medios eficaces, lo que equivale a decir en gran parte las actividades de planificación familiar, tuvieron un efecto mayor en relación a los objetivos de salud pública que apuntan a reducir la incidencia del aborto provocado, que lo tuvieron en relación a objetivos demográficos

72. La planificación familiar actúa allí, al parecer y parcialmente, como substituto del aborto entre las mujeres que otrora apelaban fundamentalmente a este medio para espaciar o limitar su prole, por lo cual se *aprecia más su efecto* sobre el aborto que sobre la fecundidad.

73. Si el lector retrocede, en su lectura, al cuadro 11 y observa lo que ocurrió en el último quinquenio en la variación promedio anual de la tasa de embarazos (variación que se debe fundamentalmente al efecto de las prácticas anticonceptivas), y en la variación promedio anual de la tasa de abortos por embarazos, hará la siguiente constatación:

EXTRACTO DEL CUADRO 11 VARIACIÓN PROMEDIO ANUAL DE LAS TASAS DE EMBARAZOS Y ABORTOS POR EMBARAZOS EN EL ULTIMO QUINQUENIO, EN DIVERSAS CAPITALES LATINOAMERICANAS

	Bogotá		*Lima*		*Panamá*		*Asunción*		*Buenos Aires*	
Tasas de	*20-34*	*35-44*	*20-34*	*35-44*	*20-34*	*35-44*	*20-34*	*35-44*	*20-34*	*35-44*
Embarazos	−9,2	+ 3,4	− 1,4	−16,2	−4,0	+ 8,2	−0,2	− 5,8	+3,1	+9,5
Abortos por embarazos	+4,5	+31,1	+39,2	+12,4	0	+27,4	−9,8	+41,3	−7,2	−4,2

74. En cada ciudad se observa que la tasa de abortos por embarazos subió más en el grupo de edades *en el cual se deprimió menos o no se deprimió la tasa* de embarazos En Bogotá, donde menguó la tasa de embarazos en el grupo 20-34 años y se observó mayor incremento del aborto en el otro grupo, el de 35-44 años, donde no mermó, sino aumentó la tasa de embarazos. Lo mismo se observa en Panamá En Lima, el aborto aumentó más en el grupo 20-34, donde se deprime menos la tasa de embarazos

75 En Buenos Aires, donde la tasa de embarazos aumenta en los dos grupos de edades y también en ambos grupos se deprime la tasa de abortos por embarazos, se observa que se deprime menos esta tasa en el grupo donde más aumenta aquélla.

76 Asunción es la excepción, pues allí en el mismo grupo 34-44 se observa la mayor depresión de la tasa de embarazos y, a la vez, un fuerte aumento de la tasa de abortos por embarazos (que decrece en el otro grupo).

CONCLUSIONES

77. En virtud de lo anterior, se pueden desprender las siguientes conclusiones.

1) En las capitales latinoamericanas estudiadas, salvo en Buenos Aires, se ha observado un aumento *importante de la incidencia del aborto en el último* quinquenio que precedió la fecha de la encuesta en cada una de ellas. También se ha incrementado en esas capitales el porcentaje de abortos por embarazos,

2) El incremento de la incidencia del aborto es mucho más importante entre las mujeres de mayor edad que para las mujeres más jóvenes (salvo en Lima, donde sucede lo contrario), lo cual señala que el uso de esa práctica es más para limitar que para espaciar los nacimientos;

3) Este incremento del aborto es frenado, o deja de observarse en los grupos de mujeres que, a través de las prácticas anticonceptivas fundamentalmente, han deprimido sus tasas de embarazos, lo cual viene a reforzar la impresión que las mujeres de las capitales estudiadas tienen el deseo creciente de limitar o espaciar su prole, por cualquier medio a su alcance;

4) La planificación familiar en las ciudades estudiadas ha tenido un claro efecto preventivo del aborto. La reducción de la incidencia del aborto entre las usuarias de los programas de planificación familiar ha sido mucho más notable que la reducción de la fecundidad

THE METHODOLOGY OF COST-BENEFIT ANALYSIS OF EXPENDITURES ON POPULATION CONTROL PROGRAMMES

Warren C. Robinson *

1. Population growth is one of the dominant issues of the day. High rates of population growth prevail in populations making up some three fourths of the world and conservative projections indicate a doubling of world population by the year 2000. Not all responsible analysts are agreed on the severity of the "crisis" being created by these trends, but it does appear to be clear that a continuation of such rapid growth will lead to economic, social and political stresses and difficulties, particularly for the countries of the developing world—Africa, Asia and Latin America. Thus, it is not surprising that in recent years, Governments of countries throughout the world have demonstrated a growing interest in controlling future population growth. Some 50 countries have now adopted official policies and/or programmes designed to reduce further population increases. [1] Countries and organizations donors of foreign aid, both on a bilateral and on a multilateral basis, now devote a substantial share of their total development aid to programmes concerning population and family limitation. The World Health Organization (WHO), the United Nations Children's Fund (UNICEF) and other international groups, as well as many individual Governments and private philanthropic organizations, also offer project support. The total of such aid in all likelihood exceeds $200 million annually now, and an even larger volume of resources is devoted to these programmes and projects out of local budgets by the Governments of the developing countries. Thus, population control programmes now represent a substantial use of the limited resources available to the developing world. [2]

2. As these programmes have grown in importance so, as one might expect, has the attention devoted to them by social scientists and analysts. "Evaluation" has become an important aspect of such programmes, just as "project appraisal" is for such infrastructure as roads or dams. A substantial literature has grown up on evaluation and it is not proposed to review that literature here. [3]

3. Instead, it is proposed to look more particularly at the problem of the economic studies of population control programmes as these have been developed, using the so-called "cost-benefit" and "cost-effectiveness" techniques. This paper reviews the conceptual framework underlying the techniques; the strengths and weaknesses of the techniques themselves and some of the most frequently voiced criticisms; and some of the applications of these techniques to actual programme data; lastly, some of the unsettled theoretical implications and practical problems arising from these approaches are discussed.

The logic of cost-benefit analysis

4. Economic considerations are a major annoyance to programme administrators. "The budgetary constraint", the need to justify any proposed expenditure and requirements that detailed accounts and records be kept, all complicate life for administrators. Administrators of family-planning programmes are often especially resentful of any economic approach. To them their programmes have such obvious benefits for society that the Government should simply allocate whatever is required to reach the desired goal and not worry about minor matters of "efficiency".

5. This point of view, however plausible it appears at first glance, is wrong for two reasons. First, it ignores a fundamental truth well understood by politicians and taxpayers around the world: namely, that resources available to any organization or agency, even to society as a whole, are indeed limited and that these limited resources must be allocated among many competing possible uses. This scarcity and the consequent necessity for choice create an economic dimension in nearly all forms of human activity, and this is as true for public or quasi-public agencies engaged in social welfare programmes as it is for anyone else. Cost-benefit analysis is nothing more than a technique by which competing programmes or projects can be ranked in terms of the net benefits over cost that they will create for society. To deny the applicability of such principles to family planning programmes is to create strong suspicions in the minds of budget officers, ministers and legislators and seriously to jeopardize support for such programmes.

6. Secondly, it is short-sighted to be impatient with all matters economic and financial. Efficiency is usually

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[1] Dorothy Nortman, *Population and Family Planning Programs: A Factbook*, Reports on Population/Family Planning, No. 2, 4th ed. (New York, The Population Council, 1972), table 6.

[2] United States of America, Agency for International Development, Office of Population, *Population Program Assistance* (Washington, D.C., 1972).

[3] Jack Reynolds, "Evaluation of family planning performance: a critical review", *Demography*, vol. IX, No. 1 (February 1972).

a by-product of scarcity and even the most socially desirable programme should attempt to operate as efficiently as possible. Any programme administrator should be interested in getting as much output as possible from whatever inputs or resources are made available to him. The systematic effort to maximize the output per unit of input (or, conversely, to minimize the cost per unit of output) has come to be called "cost-effectiveness analysis" and can be a valuable tool for the administrator in evaluating the performance of family planning programmes.

7. Thus, cost-benefit and cost-effectiveness approaches are useful and necessary economic evaluation techniques for population control programmes. However, such economic approaches to evaluation are not intended to replace other approaches to evaluation Evaluations of the clinical, socio-psychological or demographic impact of the family planning programme are also required and should be undertaken. The trick to making any evaluation really useful is so to structure the evaluation procedures that the information required is generated on a routine basis, quickly analysed, fed back into the decision-making apparatus and then stored so that it is cumulative and also easily retrievable The problems associated with ensuring that an economic and budgetary evaluation shall conform to these guidelines are, in principle, no greater than for any other approach to evaluation

8. The objective of cost-benefit analysis is to compare the costs that must be incurred in, say, the adoption of a particular investment project and the total benefits (or returns) that the project is expected to generate Since, normally, an investment project involves a stream of benefits and costs over time, it is necessary in some way to make these streams comparable in the current time period, in order to compare the total cost and total benefits In other words, the cost and benefit streams generated over the entire length of life of the project *must be discounted back to the current time, in order* to judge the current net benefit over cost.

9. The concept of discounting future economic magnitudes in order to make a current judgement is based on the economic assumption that consumption now is always preferred to consumption in the future. That is, given a choice, and with all other factors equal, a person will always prefer income (or goods) now to income (or goods) next year. Therefore, in order to compare future magnitudes to current magnitudes, the future magnitude must be reduced, or "discounted". The prevailing market rate of interest is a measure of the annual rate of return on savings (or non-consumption of current income). This rate of return induces people to save some of their current income (to postpone their consumption of it for one year). The interest rate is thus a measure of the inferiority of future goods in relation to current goods and can be used as the rate by which future benefits can be converted into current values.

10 Cost-benefit analysis is designed to compare the current value of all benefits that a project is expected to generate with the concomitant costs associated with the project, which are also expressed in terms of current value The comparison can be made in the following way: [4]

Let $C_1, C_2, \ldots, C_n$ = the series of expected costs in years 1, 2, ..., n;

$b_1, b_2, \ldots, b_n$ = the series of expected benefits in years 1, 2, .. , n;

S = the scrap value of the project;

i = the appropriate discount rate for annual compounding.

Then, if a particular project satisfies the inequality in such a way that

$$\frac{b_1}{(1+i)} + \frac{b_2}{(1+i)^2} + \ldots + \frac{b_n + S}{(1+i)^n} > \frac{C_1}{(1+i)} + \frac{C_2}{(1+i)^2} + \ldots + \frac{C_n}{(1+i)^n}$$

it is said that the benefits generated by the project exceed the costs of the project. (Alternatively, the stream of benefits could also be less than, or equal to, the associated costs, depending, of course, upon the actual values pertaining to a specific project.)

11. This process of discounting future benefits to the current time is an essential element of cost-benefit analysis in the usual sense of that term. The other important approach to estimating, for example, benefits of births prevented looks at projected future benefits in terms of *per capita* income with high *versus* low fertility using various sorts of economic growth models These approaches are not cost-benefit approaches. [5]

12. The important result of cost-benefit analysis is *the creation of a simple, straightforward decision rule.* if benefits exceed costs, the project should be undertaken. Or alternatively, the project that shows the highest ratio of current benefits to costs should be chosen from the possible array of competing projects. This is why cost-benefit analysis has gained so much favour in recent years for analysing and comparing alternative investment projects.

13. It is clear, then, that the basic logic of cost-benefit analysis is straightforward and easy to grasp In the application of the principle, however, a series of issues immediately arise that complicate actual analysis and may obviate much of the conceptual neatness of the technique. Cost-benefit analysis has been applied to a

[4] A R. Prest and Ralph Turvey, "Cost-benefit analysis: a survey", *Economic Journal*, vol 75, No 4 (1965), pp 683-735.

[5] Warren C. Robinson and David E Horlacher, "Economic benefits of fertility reduction", *Studies in Family Planning*, March 1969. Gavin W Jones, "The economic effect of declining fertility in less-developed countries", occasional paper, New York, The Population Council, 1969

number of actual country programme situations. [6] In all these cases, the net benefits of fertility reduction appear large and the use of government programmes to this end more than justified. Nevertheless, there are a number of important questions that can be asked concerning these findings, particularly about the evaluation of the benefits.

Cost-effectiveness as an alternative

14. Cost-effectiveness analysis avoids some of the possible pitfalls of the cost-benefit technique by assuming the benefits and then looking at the relationship between inputs, or costs, and project performance. In other words, this approach seeks the most effective, or least costly, means of achieving an explicit public sector objective, rather than, as with cost-benefit analysis, evaluating and comparing the social value of benefits and the social value of costs. [7]

15. As this type of technique takes as given a specific objective, the approach is much less ambitious than cost-benefit analysis. It cannot decide for or against a given project, and it cannot rank alternative projects.

16. This technique has been tried by numerous government agencies in recent years as the Planning-Programming-Budgeting System (PPBS). Even more recently, the same approach has been utilized in the investigation of alternative programmes to achieve desired objectives in the area of population policy.

17. There are many obvious uses for such analysis in designing a programme. If, for example, given a certain family planning budget, the choice is between a high-volume concentration on urban areas or a more thinly spread programme affording national coverage, a proper estimation of the underlying economic relationships would make it possible to judge the costs per unit for the two strategies and thence the maximum programme output achievable by choosing the one strategy over the other.

18. Similarly, knowing the impact on the cost per unit of the choice of contraceptive devices or delivery systems would make it easy to minimize costs for any given programme volume by selecting the right "mix" of methods and systems.

19. Lastly, differences in cost per unit among various geographical or administrative units within a programme may be explicable in terms of differences in the socio-economic structure of the units—urbanization, transport and communications, literacy, income levels and so on. Where this is not the case, differences in unit costs may be indicators of differences in management efficiency and a clue as to how to tighten up the programme.

20. In fact, several programmes have employed the cost-effectiveness approach in recent years. [8]

Problems of cost-benefit analysis

Measuring the benefits of reducing population growth

21. Cost-benefit analysis has been employed in the evaluation of proposed investment projects and pro-

[6] A partial list includes: for India, Julian Simon, "The value of avoided births in underdeveloped countries", *Population Studies*, vol. XXIII, No. 1 (1969), pp. 61-68; S. N. Agarwalla, "Need for cost-benefit analysis in family planning", paper prepared for the United Nations Economic Commission for Asia and the Far East, Expert Group on Assessment and Acceptance and Use-Effectiveness of Family Planning Methods, Bangkok, June 1968; George B. Simmons, *The Indian Investment in Family Planning*, (New York, The Population Council, 1971); Robert Repetto, *Time in India's Development Programs* (Cambridge, Mass., Harvard University Press, 1971); Steven Enke, "The economics of government payments to limit population", *Economic Development and Cultural Change*, vol. IX (July 1961); for Chile, Leonard G. Bower, "The return from investment in population control in less developed countries", *Demography*, vol. V, No. 1 (1968), pp. 422-432; for Jamaica, Timothy King, *The Measurement of the Economic Benefits from Family Planning Projects and Programs*, International Bank for Reconstruction and Development, Economics Department Working Paper No. 71 (Washington, D.C., 1970); for Egypt, George Zaidan, "Population growth and economic development", *Finance and Development*, vol. VI, No. 1 (1968), pp. 2-8, expanded in *Studies in Family Planning*, vol. XLII, No. 1, pp. 1-6; for Pakistan, M. Aminur Rahman Khan, "Economics of family planning programmes", *Pakistan Journal of Family Planning*, vol. III, No. 2 (July 1969); for Philippines, Trinidad S. Osteria, "Cost-effectiveness and cost-benefit from the Philippines family planning program", University of the Philippines, Population Institute, Family Planning Evaluation Office, July 1972 (mimeographed). For general discussions of the approach applied to population, see Timothy King, "Budgetary aspects of population policy: the role of benefit-cost analysis", in International Union for the Scientific Study of Population, *International Population Conference* (Liège, 1973), vol. I; Steven Enke, "The economic aspects of slowing population growth", *Economic Journal*, vol. 76 (March 1966); Harvey Leibenstein, "Pitfalls in benefit-cost analysis of birth prevention", *Population Studies*, vol. XXIII, No. 2 (1969), pp. 161-170; T. R. C. Curtin, "The economics of population growth and control in developing countries", *Review of Social Economy*, vol. XXVII, No. 2 (September 1969).

[7] J. Morley English, ed., *Cost-Effectiveness: The Economic Evaluation of Engineered Systems* (New York, John Wiley and Sons, 1968); W. C. Robinson and others, "Cost-effectiveness analysis as an evaluation technique in family planning programs", Pennsylvania State University, June 1971 (mimeographed).

[8] A partial list includes: for India, Ramesh Mehta, *An Analytical Study of Family Planning Programmes in States* (New Delhi, 1972); for the United Kingdom of Great Britain and Northern Ireland, Caspar Brook, "The cost effectiveness of family planning", *Family Planning Miscellany* (London, Family Association, 1968); for Puerto Rico, William J. Kelly, *A Cost-Effectiveness Study of Clinical Methods of Birth Control, with Special Reference to Puerto Rico* (New York, Praeger, 1972); for El Salvador, Juan B. Londono, "A cost-effect analysis of a family planning program: findings of a quasi-experimental study", *Studies in Family Planning*, vol. IV, No. 1 (January 1973); for Singapore, Wan Fook Kee and Quah Siam Tee, "Singapore: a cost effect analysis of a family planning program", *Studies in Family Planning*, vol. III, No. 1 (January 1972); for Indonesia, R. Pudjo and T. Reese, "The Indonesian national family planning program: a cost-effectiveness analysis", Monograph No. 3, Technical Report Series, Jakarta, National Family Planning Coordinating Board, July 1972; for the Philippines, Trinidad S. Osteria, *op. cit.*; for Colombia, William J. Kahley, "Family planning in Colombia: an analysis of cost and achievement", unpublished doctoral thesis in Economics, Pennsylvania State University, 1972; for the United States of America, Gerald Sparer and others, "How much do family planning programs cost?", *Family Planning Perspectives*, vol. V, No. 2 (Spring 1973). One comparative study of several countries has also been done: see W. C. Robinson and others, *op. cit.* See also Donald J. Bogue, *Family Planning Record Systems and Cost-Effectiveness Analysis*, Family Planning Evaluation Manuals, No. 11 (Chicago, University of Chicago, Community and Family Study Center, 1973).

grammes in the field of natural resources for several decades. Indeed, the basic logic is that of traditional investment theories. The evaluation of the profitability of any proposed investment involves the estimation of future returns (value of outputs), the discounting of these future returns back to the current time (since resources must be committed to the investment in the current time) and lastly, the comparison of this current capitalized value of future returns to current known costs of undertaking the proposed investment.

22. The application of such cost-benefit analysis to social investment projects is rather more complicated since the returns (or benefits) are less straightforward than in the case of ordinary capital investment The benefits may be such that no return in a monetary sense is ever realized by the investing agency, and, indeed, the most important benefits may be "spill-overs" or second-order benefits affecting persons or groups not directly involved in the programme.

23. At the micro-economic level, as Becker has suggested, the married couple, consciously or otherwise, "invests" in children and there is a trade-off with current consumption by the couple themselves or with some other type of asset. [9] In developed countries, the flow of future benefits from the current "purchase" of a child is largely subjective, non-monetary and intangible. However, in the developing world, where children are still viewed, rightly or wrongly, as economic assets because of their future earning potential to the family,

[illegible]

the practice of family limitation, might still choose what would appear to outside observers a large number of children. This can, perhaps, be viewed by the couple as a *special type of investment* designed to create production in years to come at the expense of consumption today.

24 At the macro-economic level, the social costs of [illegible]

birth is the extra output that such resources could have produced had they been employed in truly productive investment. Thus, the benefits of population control are social costs not incurred (or incremental output not lost) because birth rates are lowered However, these gross benefits must be netted against the stream of future outputs that the higher raher than the lower birth rate would have produced If the analysis is kept to the short run, say 20 years or less, preventing births today has only a minimal effect on output since it takes some 15 years for a birth cohort to reach the labour force ages. Even in the longer run, the often asserted doctrine of "zero marginal productivity" of labour can be invoked to support the argument that additional members of the labour force add nothing to output and thus that no future "returns" are being forgone by preventing births. Indeed, so long as additional workers over their entire lifetime are producing little above what is required for subsistence, then their net output (or net productivity) is zero and preventing their birth entails no loss of net output that could have been used for other purposes

25. However, the doctrine of zero marginal productivity of labour remains debatable, to say the least Empirical evidence is contradictory and a very significant share of informed opinion argues that agricultural technology and land use show considerable flexibility under population pressure. [11]

26 It is also frequently argued that preventing births will increase the ability of the economy to generate savings for capital formation For so long as the marginal product per worker is below the average product per worker and both are falling, it is inescapably the case that reducing the number of workers will increase the average product (and income) per worker. To put it another way, if the optimum population (that is, a population level that, given the stock of the other factors, allows a maximization of the output per worker) has already been exceeded, any measures that prevent further population increases must result in income *per capita* higher than would have otherwise been the case. Coale and Hoover and others have argued that savings are a function of *per capita* income Thus, decreasing population, even if total income remains unchanged, will increase aggregate savings. [12]

27. On this relationship also the evidence is weak and mixed. [13] There is, at least, no compelling statistical

[9] Gary Becker, "An economic analysis of fertility", in National Bureau of Economic Research, *Demographic and Economic Change in Developed Countries* (New York, 1960). See also Richard Easterlin, "Toward a socio-economic theory of [illegible]

[11] Colin Clark, *Population Growth and Land Use* (New York, St [illegible] *of Agricu*[illegible] *under Po*[illegible] J N. Sir[illegible] populatio[illegible] Study of [illegible]

[illegible] savings", un- [illegible] and savings [illegible] 5 (1969), [illegible] savings rates [illegible] ountries", in [illegible] Population, [illegible] 73), vol 1, [illegible]

support for believing that reduced fertility automatically leads to increased savings. Indeed, some studies suggest that decreased fertility is accompanied by increased consumption of certain types of modern durables. [14]

28. These arguments focus on the relationship between *per capita* income and consumption. However, one can also argue that income in most developing countries, at least, is a family-related variable. If the birth rate falls, the size of family is reduced, and since total consumable income (or subsistence output) per family will not change in the short run at least, the consumption per family member rises. In other words, perhaps a falling birth rate does not "free" resources from consumption for investment but instead increases consumption *per capita* of the existing population. Now, since rising consumption *per capita* is likely to generate rising productivity per worker, the result may still be favourable to investment in the long run. Unfortunately, here too, the evidence is very scattered and weak. The relationship between consumption, nutrition and productivity is not yet well identified and is still intuitive rather than quantitative. [15]

29. Lastly, as is well known, a falling birth rate means a shift in the age distribution of the population such as to reduce the proportion of non-producers. It also appears a fair assumption that the requirements for many welfare (and social overhead) programmes are a direct function of the proportion of non-earners. Reducing the proportion of non-earners in the population will thus reduce the share of any given amount of the total social investment funds available which must go to: (*a*) relatively unproductive relief and social welfare programmes; (*b*) maintaining a constant social overhead investment *per capita*. With a lower birth rate and a relative reduction in non-earners, a larger proportion of any given investment funds available can go to directly productive investments in agriculture or industry and also to a rising *per capita* level of social overhead investment (education, health and so on) *per capita*.

30. This chain of reasoning is also suspect when it is examined closely; [16] and, in any case, is of little consequence in countries lacking any well-developed social welfare programmes.

31. Thus, the numerous studies that have been undertaken of the benefits of reducing fertility in developing societies (typically yielding estimates of from two to three times the current *per capita* income) are based on some combination of the following assumptions: (*a*) the marginal productivity of labour is low and falling, so that persons born today will consume for their subsistence more than they will produce; (*b*) savings are a function of *per capita* income, not of aggregate income; and in consequence, other things being equal, the larger the population the smaller the savings; (*c*) the volume of social welfare services supplied by the Government—education, health, housing and so forth—is related to the size, growth rate and age distribution of the population in such a way that the higher the growth rate, the larger the absolute volume of such services that will be supplied; (*d*) technological change is in no way related to population growth or pressure, so that future improvements in economic efficiency will flow mainly from current levels of capital investment.

32. As has been indicated, the evidence on most of these points is at least mixed and it is not clear that these assumptions fit all countries of the developing world.

33. There is the further more purely philosophical assumption implicit in the evaluation of benefits that it is the current generation—those alive today—which is important. The discounting of future flows back to the current time makes this assumption.

34. Perhaps more importantly, this approach also assumes that the benefits that need to be accounted for are societal in nature and external to the procreating family units. Possibly the hidden assumption is really only that the internal benefits of family limitation are always positive and simply reinforce the external benefits. In fact, this need not be so.

Micro- versus *macro-benefits*

35. Most estimates of the costs of high fertility (and the benefits of reducing fertility) are derived from macro-economic models of the entire economy and fail to make the important distinction between the costs to the procreating couples themselves *versus* the "externalities" or costs to society at large. Thus, the net cost to society of a marginal birth measured in terms of the future requirements for education, health, capital equipment and food-stuffs may be high, but the immediate out-of-pocket costs to the family unit involved may be nil. And if any value is assigned to the child, either as a consumption good or as a productive asset, there may actually be a net benefit to the family even from a high parity-order birth. This may be illustrated with a matrix of all possible (imaginable) costs and benefits, micro and macro, as shown in the figure given below.

36. Let family *A* have an additional child. The benefits it receives are of the familiar three types first noted by Leibenstein: (1) the utility to be derived from the child as a consumptive good; (2) the utility to be derived from the child as a productive agent; (3) the utility derived from the prospective child as a potential source of security either in old age or otherwise.

John Isbister, "Income redistribution, birth control and the rate of savings: the case of Mexico", *Demography*, vol. X, No. 1 (February 1973).

[14] Eva Mueller, "The impact of agricultural change on demographic development in the third world", *International Population Conference* (Liège, 1973), vol. I.

[15] C. Clark, *op. cit.*; Massachusetts Institute of Technology, "Nutrition and national development: Proceedings of an international conference", forthcoming, 1971.

[16] Robert H. Cassen, "Population growth and public expenditures in developing countries", in International Union for the Scientific Study of Population, *International Population Conference* (Liège, 1973), vol. I.

Costs and benefits of fertility allowing for external and internal effects

	Family units					Society as a whole
	A	B	C		N	
Benefits						
(1) Direct consumptive pleasure						
(2) Increased output						
(3) Future security						
(4) Prestige and power						
Costs						
(1) Food, clothing and shelter						
(2) Education, health, etc						
(3) Increased prices of some goods						
(4) Increased taxes to support transfer-welfare programmes						
(5) Density and crowding costs						
(6) Aesthetic considerations						

37. The external effects it causes will include an effect on future labour markets. the increased supply of labour will, other things being equal, lower wage rates, which would be a benefit to employers of labour and to suppliers of capital (Clearly, it would be a negative effect for other labourers whose wages would also be affected.) These "externalities" are still micro and negative for some family units, positive for others.

38. The only completely macro-effect shown is one labelled "power and prestige", and this is indeed a nebulous one. Perhaps, it is properly considered an "externality" accruing to those nationalistic politicians and journalists who feel that power and prestige follow from sheer numbers and who are, therefore, delighted at the prospect of larger families.

39. Turning now to costs, the costs of direct expenditure on food, clothing and shelter are, it may be assumed, borne by family unit A in the illustration. Likewise, the less urgent but still desirable direct expenditure on health education and the like also probably fall on family A. However, to the extent that any transfers or publicly supported welfare programmes are operated to subsidize unit A for these direct expenses, an externality arises affecting many (but presumably not all) other micro-units. The increased numbers of people in unit A will also give rise to increased demand for certain goods—food certainly and other essentials—which, assuming rising marginal cost curves, can be produced only at higher prices. The result is that all consumers of these products—in the short run at least—are slightly worse off. However, the producers who benefit from the higher prices are slightly better off.

40 Also listed as a possible cost is the increased density and crowding that may arise as unit A increases in size Streets, public transport and theatres are slightly more crowded than before, and the cost is borne by everyone using these facilities, in the form of increased time spent waiting, increased jostling and physical crowding and, perhaps, decreased efficiency of these services Perhaps the closest thing yet found to a category that affects everyone negatively are these societal costs or true social externalities.

41. Lastly, an aesthetic cost is listed. Sheer numbers and sheer density cause pain to some people on non-material grounds. The aesthetic cost is important to many conservationists in the United States of America and other developed countries, and it holds good too many Asians who feel a horror of modern cities as contrasted to the traditional village life. (This is, perhaps, the logical counterpart of the "increased prestige" benefit) Quantification eludes one here, but it at least is a possible cost to some groups.

42 The result of this discussion of costs and benefits is a picture of a situation in which several types of costs and benefits affect the micro-units making up the society in uneven, conflicting or partially offsetting ways. No easy answer emerges about who benefits or even whether net benefits do occur.[17]

[17] H Leibenstein, "Pitfalls in benefit-cost analysis of birth [illegible] turns of Family Planning Programmes, June 1972.

Summary

43. In the preceding section, some of the implicit assumptions have been indicated concerning the economic and social linkages and structures on which rests the typical effort to evaluate the benefits to society of fertility reduction programmes. These economic assumptions are employed in the absence of solid answers, country by country, to the straightforward question of whether or not population growth is associated with falling productivity, reduced savings and investment, increased non-productive welfare transfer and a general retardation of economic progress. Where there is such an association, external (or societal) benefits undoubtedly exist. There is, however, the additional problem of computing the internal (to the procreating couples) benefits (and costs) of reducing family size. These internal effects must then be netted against the external effects before any conclusion can be drawn about over-all net benefits to society and its various members.

44. Lastly, all the approaches to the evaluation of benefit thus far suggested focus on the generation now alive. Should it be proposed that society as a whole, in an intergenerational as well as a cross-sectional sense, be the appropriate beneficiary, then the analysis becomes considerably more complicated.

Problems of cost-effectiveness analysis

45. As stated above, cost-effectiveness analysis is a special variation of cost-benefit analysis. By taking the benefits for granted, it avoids most of the problems reviewed under benefit evaluation. Its objective is to maximize programme output per unit of resource input; or, looking at the dual theorem, cost-effectiveness analysis is directed towards minimizing the cost per unit of output. It is, thus, more purely a management tool or an administrative control device. There are, however, numerous problems also inherent in this approach.

The substitution problem

46. Most fundamental in measuring programme output is the fact that a programme may in practice end up incorporating or substituting for a previously existing family planning effort by private households. The matter can be expressed in general terms as follows:

(*a*) In a typical population, some groups will be practising contraception even in the absence of any publicly supported programme. These groups may be using anything from relatively inefficient "folk" methods, such as *coitus interruptus*, to sophisticated biological and chemical methods, such as the pill, purchased through commercial channels. Thus, there will already be a "programme", but it will be a totally decentralized, unplanned programme whose effect on fertility will be unknown;

(*b*) When a public programme is launched, it almost certainly will have the effect of substituting for some of this previous private effort. That is, the most likely candidates for intra-uterine devices or sterilization will be couples already practising contraception by less effective means. Similarly, couples using conventional methods will then be able to obtain supplies more cheaply through participation in the programme. The limitations of this process appear when the programme accomplishes no net increase in actual family planning effort—that is, when all the apparent programme output is simply substitution; or when the programme reaches an entirely different group and is entirely a net addition to previous family planning efforts—where, in other words, there is zero substitution. One may assume that the typical situation in a developing country will fall between these extremes. That is, even before the public programme begins, some groups will have below average fertility and, perhaps, over-all rates will have begun to fall, thanks to private efforts. The public programme then will substitute to some extent, but probably also will increase the contraceptive efficiency even of those who have practised contraception over a long period, as well as reaching some new groups. On both these scores, the impact of the programme will be to accelerate the fertility decline.

Defining and measuring programme output

47. The problem of what constitutes output for a family planning programme is related to, but not identical with, the problem of how to measure the success of a programme.

48. Output can be measured in terms of the specific units of the services generated by the programme—the number of intra-uterine devices inserted, of sterilizations performed and so on. In the terminology of economics, these are really intermediate goods supplied by the programme to the clients who then actually "produce" the true final output—births prevented. It is from this final output that the final benefits flow.

49. For the more purely clinical contraceptive methods—sterilizations and intra-uterine devices—the relationship between the intermediate output generated by the programme and the final output in terms of births averted can be ascertained rather accurately once age, parity, marital status, mortality expectations and retention rates for intra-uterine devices are known. However, for non-clinical methods—condoms, foam, oral contraceptives and others—the "use-efficiency" factor looms so large that, even if those data are known for couples employing the technique, the relationship of the intermediate to the final output is still difficult to estimate. Moreover, for most programmes, available satistics on conventional contraceptives refer to total supplies distributed or sold; and the other crucial elements—number of couples actually using these supplies and frequency of use per couple—are not known.

50. Thus, for evaluation purposes there is much to be said for using some measure of intermediate output rather than attempting to use a final output measure

such as births averted. Moreover, the substitution problem can be ignored if by "output" is meant the specific and narrow accomplishment by a programme of certain, specific quantitative objectives. These specific outputs of the programme are perhaps the most relevant, since the aim is to evaluate the efficiency of the administrative programme.

51. In fact, it is not necessary to choose between final and intermediate performance measures. Outputs for the cost-effectiveness analysis of family planning should be defined as those specific services or supplies generated that can be directly related to the inputs used in the process. These outputs will be intra-uterine devices inserted, sterilizations performed and so on. Using such disparate output measures, however, raises questions as to how to combine them into a single output index.

The couple-years-of-protection index

52. The concept of the couple-years-of-protection (CYP) index was developed by Samuel M Wishik in connexion with the family-planning programme in Pakistan This measure makes possible a comparison of performance even when the "mix" of the various methods differs from district to district.[18]

53. The method, to summarize it briefly, is to allow one couple-year of protection for: (*a*) every 12-month period lived by a fecund, currently married male or female who has been sterilized; (*b*) every intra-uterine device in place for one year; (*c*) each total of conventional (condoms, foam etc.) and oral contraceptives distributed which (given coital frequency) would be enough to provide contraceptive protection for one calendar year. The CYP index can then be computed for any geographical or administrative subunit for which data are available.

54. Thus, to illustrate, in Pakistan the achievement index (couple-years-of-protection) was computed as follows.

$$CYP_n = \frac{C_n}{100} + 0769\, O_n + (V_n + TL_n)\, 7.5 + I_n\, 2.5$$

where:

C is total conventional contraceptives distributed,

V is vasectomies,

TL is tube ligations;

O is oral pill cycles distributed;

I is intra-uterine devices inserted.

55 The parameters assumed are: coital frequency of 100 per year; the average number of years an intra-uterine device is retained by a married, fecund female (allowing for reinsertions) as 2.5; the average number of fecund years remaining to a woman before she dies, is widowed, or reaches menopause, after she or her husband has been sterilized is assumed to be 7.5 years; since it requires 13 cycles of oral pills per calendar year, the total of oral cycles distributed must be divided by 13 to reach "couple-years" and this is the same thing as multiplying by .0769.

56. This technique assumes that the use-effectiveness of intra-uterine devices is 100 per cent, just as when it is stated that 100 condoms or 13 oral cycles equal one couple-year of protection the same assumption of 100 per cent effectiveness is being made. The justification for such an assumption is, as indicated above, that the measure is of intermediate output, with this output then being filtered through "use-effectiveness" to reach the final output of births prevented An alternative way of handling these non-clinical inputs is to relate the number of contraceptive units to the number of client couples using them Thus, one female who resupplies herself with oral contraceptives on a regular basis for 12 months, or one male who purchases condoms regularly for the same period, would equal one couple-year of protection. Here, too, there is the implicit assumption of 100 per cent use-effectiveness.

57 The CYP index described above is a measure of the current achievement of the programme, including the achievement that will be realized in the future. It is not a measure of the current level of protection being afforded to the population (or prevalence in Wishik's terminology), which must take into account the carry-over of past achievement into the present as well as some part of the current achievement.

58 Current achievement measures changes in prevalence during the period in question, but it also includes changes in future prevalence as well. The relationship between prevalence and achievement may be seen conceptually as a matrix with the time of insertion, sterilization or contraceptive distribution along the vertical axis and the time during which the couple is protected along the horizontal axis. Summing row-wise gives the achievement in each year (row), while summing column-wise gives the prevalence of protection in each year (column). Thus, the achievement in year 1 would include elements of protection extended through years 1 to *n*, while prevalence in year 3 would include some part of the achievements of years 1-3. The achievement index suggested above measures future as well as current output and is thus more meaningful in assessing the cost per unit than a prevalence index, which would treat a sterilization as being the same "output" as supplying a couple for a year with condoms. On the other hand, since achievement is partially unrealized as yet, no easy comparison can be made with the total target population of the programme. However, CYP prevalence can be expressed as a proportion of couple-years at risk in the current year.

[18] Samuel M Wishik, *The Couple-Year of Protection Index: A Method of Measuring Achievement and Prevalence of Contraceptive Protection*, Manuals for the Evaluation of Family Planning and Population Programs, No 7 (New York, Columbia University, International Institute for the Study of Human Reproduction, 1973)

59. When data required for calculating couple-years of protection are not available, some even more simple index such as "clients" or "new acceptors" can also be used to approximate performance.

Defining and measuring costs of population programmes

60. The list of inputs to the family planning programme will, it appears clear, be a long and heterogeneous one: some of the time of highly skilled medical personnel or top government administrators, the services of a semi-skilled jeep driver, the production cost of intra-uterine devices, the incentive payment paid to field-workers and so on. There may also be resources flowing into the programme from foreign donors—governmental and private—which must be added to local expenditure. Similarly, the programme will typically include local private groups—family planning associations, for example, as well as official programme operations. The national family planning budget may not include funds that are raised and spent entirely at the provincial or local levels. [19]

61. In some countries, family planning is merely part of a more general maternal and child health or rural public health programme. In the latter case (and inevitably to some extent also in the former), "joint-cost" problems arise: when field-workers or clinics are concerned with family planning as well as general maternal and child health work, how much of the cost of such workers and clinics should be allocated to family planning alone?

62. Similar problems arise for administrative and other overhead expenditure which supports many programmes, only one of which concerns family planning. An especially difficult case is that of the handling of research and evaluation. Very frequently, expensive, highly sophisticated research projects are undertaken in conjunction with a family planning action programme. There are "spill-overs" for the programme; but the major output of the research spending may be a product called research, not a product called family planning, however the latter is measured.

63. There is no easy solution to such problems, and, very frequently, quite arbitrary allocations of such joint costs must be made. However, this is true of nearly all applications of programme-performance budgeting to public activities and the exercises prove useful even so.

64. What does appear clear is that it is essential to be able to construct a truly consolidated budget, covering all inputs of all kinds, from whatever sources. Where programmes are partially private and partially public or split among several private and/or public agencies, a separate budget (and also separate performance figures) should be constructed for each. Generally speaking, such budgets will already exist, and it is only a question of pulling them together into a single, standard form. Even when the programme is of this "federal" sort, for over-all analytical and evaluative purposes, the exercise of summing up all the parts to arrive at a grand total consolidated budget for the entire programme effort will be useful.

65. Knowing the budget for family planning—the total funds and resources allocated or earmarked for the programme—is only the beginning. These funds may or may not all be spent in the given period. They may be spent quickly, early in the accounting period, or there may be a bunching of the actual payment of bills late in the period in which the liabilities are incurred. This is the familiar budgetary problem of disbursements *versus* accruals and it sets limits on the ability to deal with shorter periods—months, for example—rather than quarters or years. There is the related, but still different, problem which arises from the lag between programme expenditure (however figured, whether as cash or accrual) and actual accomplishment or performance. The pipeline for supplies or services may be long, and money spent today may generate output several months from now. In general, the concern is with units of input when these actually enter into or are used up by the programme and should take actual expenditure rather than authorizations or allocations.

66. The most commonly used distinction made among various types of cost in accounting analysis is "indirect" (or "fixed") *versus* "direct" (or "variable"). The former category is also called "overhead costs" and refers, in general, to costs that are not directly related to the level of programme activity or intensity. Such costs as rent, administrative salaries or capital equipment are relatively fixed, once the general scope and scale of the programme have been decided. Other costs, such as field expenses, contraceptive supplies or transport, vary as does the level of intensity and output of the programme.

67. In principle, all costs, indirect as well as direct, should be included in the total costs for analytical purposes. It should also be remembered that the distinction between indirect and direct is not the same as that between capital and current costs. Capital items—vehicles, buildings etc.—should be charged off over their estimated useful life and only a portion of this total debited to current costs. This is ordinary accounting procedure.

68. The list of all possible inputs or costs may be very long; but, in fact, most studies indicate that personnel costs represent the overwhelming share of the total—60-70 per cent in most cases.

69. Thus, total costs can frequently be rather closely approximated if the number of personnel of various job types used by the programme and the average wage-rate for each job type are known. Moreover, for some purposes, it is useful to express programme inputs in physical terms (man-hours, physician-days or clinic-

[19] John A. Ross, "Cost of family planning program", in Bernard Berelson and others, eds., *Family Planning and Population Programs* (Chicago, University of Chicago Press, 1965); W. C. Robinson and others, *op. cit.*; E. K. Hawkins and G. Zaidan, *The Treatment of Population in Bank Economic Work*, International Bank for Reconstruction and Development, Economics Department Working Paper No. 16 (Washington, D.C., 1968).

sessions) as well as in financial terms Thus, ideally, the records should also show these units.

Summary

70. Cost-effectiveness analysis avoids most of the problems arising from benefit evaluation By using physical measures of programme performance—contraceptives distributed, acceptors, couple-years of protection—the output of the programme can be defined quite precisely. These measures are, in fact, intermediate compared with the final output of births prevented But for programme evaluation an intermediate output may actually be a more accurate index of performance. It also avoids the substitution problem—the difficulty of separating births prevented solely by the programme from births that would have been prevented in any case Programme outputs, as it is suggested they be defined here, would not have occurred without the programme

71. There is a wide range of problems arising from the need to measure programme inputs accurately, including the "jointness" of some costs with those of other programmes These problems, however, are, in principle, no more difficult to solve than similar problems arising in a cost-effectiveness analysis of any relatively complex social welfare programme Care in the definition of concepts, accuracy and detail in the keeping of records, and an adequate storage and retrieval system go a long way towards solving these problems.

General conclusions

72. This paper has attempted a critical review of the cost-benefit framework of economic analysis as it has been applied to national population control programmes in developing countries. It is considered that the conclusions below are warranted after this review:

(*a*) The cost-benefit framework is nothing more than an adaptation of partial economic analysis to investment decisions involving a flow of returns over time. To reject in principle the applicability of such a framework to population programmes is equivalent to saying that such concepts as scarcity, conflicting aims and the need for choice, or the desire to maximize benefits, are not relevant. This would appear to be a strong statement,

(*b*) The conceptualization and quantification of the benefits pose the greatest problem for any cost-benefit

capita income were greatly over-simplified. A full

couples and also the externalized net costs to society, both direct and indirect Very few such complete analyses have been undertaken thus far. It appears to be clear that the over-all benefits to be expected from a successful population control scheme may be lower than currently estimated for some countries, while for others they may be considerably higher. (One can even speculate that differences in the mass acceptability of such programmes among countries may reflect differences in the true social and family benefits to be created by the programmes.);

(*c*) Cost-effectiveness analysis is nothing more than a special type of cost-benefit analysis which assumes the benefits to be sufficient and then analyses the cost per unit of output, to obtain the optimum resource usage pattern. Cost-effectiveness analysis lends itself very well to linear programming techniques and is also logically an extension of simple economic analysis. It has been employed with some success as a programme evaluation device in several family planning programmes and, indeed, should be part of any well-managed public programme;

(*d*) The difficulties that arise with regard to the definition and measurement of both programme costs (or inputs) and programme performance (or outputs) are not as serious as those encountered in dealing with benefits and are manageable One serious difficulty lies in separating the final effects (or output) of the pro-

selecting or constructing an index of performance or output that can be related to inputs. Various solutions have been developed, including the couple-years-of-protection index, which is a multiple-method weighted index, and also the use of several indexes simultaneously,

(*e*) Generally speaking, the greatest confusion, uncertainty and controversy rages around the benefits of reducing population growth (or the costs of such growth), and it appears that there will be no easy or final settlement of this debate in the near future. In many ways, this debate in the population/family planning sphere is only one aspect of the larger debate which continues to rage over the specification and quantification of a meaningful social and economic welfare function. When examined closely, nearly all public expenditure programmes are based on partial analysis and contain strong arbitrary elements. Population control programmes are new and still somewhat controversial, but their economic (or welfare-creating) justification, while imperfect, is probably at least as strong as that of any other field of programme action by the public sector.

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RESEARCH ON THE BIOMEDICAL ASPECTS OF FERTILITY REGULATION AND ON THE OPERATIONAL ASPECTS OF FAMILY PLANNING PROGRAMMES

World Health Organization

1. Current trends in family planning can be interpreted with varying degrees of optimism or pessimism; nevertheless, the actual levels of practice remain far removed from the goals set by the programmes. Analysis of the cause of this relative failure is complicated by the interaction between social, economic, cultural, political and personal factors. However, problems that have emerged in most programmes centre around the availability of methods of birth control to meet a variety of personal needs and preferences, for continued and successful practice, the motivation of individuals to practice family planning and to utilize the services, and the adequacy of the approaches used to deliver family planning care.

2. This paper deals with one aspect of these problems, namely, the potential role of research and development in their solution. The necessity for such research has not gone unchallenged. It has been stated, for example, that available contraceptive technology has proved its success; all that is required is making it available on a wide enough scale. However, although every new advance in this technology has introduced family planning to additional groups in the population, it has still failed to meet the requirements of others. Moreover, despite these advances, the technology remains relatively crude, inconvenient and, for many methods, associated with unacceptable side-effects on health.

3. It has also been argued that family planning programmes can go forward, on a common-sense basis, without elaborate service research. Although any approach may meet with success in its initial stages since it can cater for segments of the community ready and eager for family planning, a programme not tailored to the over-all requirements of the community cannot succeed. Decisions on the approaches to be adopted require, at the very least, measurements and information derived from sensible studies and small experiments. Although such studies cannot dictate policy in any absolute sense, they will provide guidelines, eliminate options and indicate ranges of feasibility. It may be significant that, in successful family planning programmes, there has been a regular interaction from the very beginning between pragmatic service research and the programme.

RESEARCH ON THE BIOMEDICAL ASPECTS OF FERTILITY REGULATION

Characteristics of methods of fertility regulation

4. Methods of fertility regulation are viewed differently by biologists, clinicians, users and providers of services. The biologist tends to classify them according to the step of reproduction with which they interfere: the formation of eggs (ova), the coming together of egg and sperm, the imbedding of the fertilized egg in the womb (uterus) and the course of pregnancy. The primary concerns of the biologist and the clinician are to achieve a high degree of effectiveness in a method for regulating fertility and to avoid any risk to health entailed by its use.

5. The perspective of the individual man, woman or couple is somewhat different, although to them also effectiveness and safety are important. Choice of contraceptive may be largely determined for them by the circumstances surrounding its use: whether by the man or the woman; whether immediately before or after the sex act, or dissociated from it entirely; whether it involves drugs, devices or surgical interference; whether its effect is temporary, permanent or reversible. Social, cultural and moral considerations will all play a part in influencing use of specific methods. Cost may also be a determining factor, as well as ease of obtaining and source of the contraceptive. A method like the intrauterine device (IUD) which involves an internal examination may be unacceptable to certain cultures.

6. User preferences should be the primary determinants of the provider's choice of methods for family planning programmes. The provider may, however, be limited by other constraints, such as lack of availability of trained staff required for management of certain methods (e.g. for IUDs or vasectomy), special facilities (e.g., for abortion), adequate channels of distribution (e.g., for condoms and pills) or funds (e.g., for purchase of foreign goods, such as pills). The selection of methods is likely to be subject to pressure from special groups, professional, commercial, religious or political. It will also be influenced by the characteristics of certain population groups, such as level of education, motivation for family planning, health and nutritional status.

7. One of the immediate implications of the multiple requirements outlined above is the need for a wide range

of contraceptive methods. The quest for an "ideal contraceptive" is based on the mistaken and simplistic assumption that any single method would be universally acceptable. The need for better methods of fertility regulation and hence for research should not obscure the contribution made to health and welfare by currently available agents. This contribution, in terms of the number of unwanted pregnancies avoided and the associated mortality and morbidity, considerably outweighs the risks from the use of current methods. On the basis of available data, the risk of death even in more developed countries from pregnancy and delivery is considerably higher than that associated with any method. Where maternal mortality rates are relatively high, as in many developing countries, the risk from birth control is even less significant in comparison with the risks associated with pregnancy Mortality from illegally induced abortions far exceeds mortality from the use of contraceptive methods.

Current research and development of methods of fertility regulation

8. Current research and development follow two main approaches to improve existing methods and to assess their suitability in different populations, and to develop new technology. Efforts to improve range from relatively small changes in dosages of drugs, or the shape and composition of IUDs, to more ambitious attempts at altering drugs and formulations to extend considerably their period of efficacy (e g , the once-a-month pill) and providing new routes of administration (e g , injectable preparations) The aims are to increase appeal of the method, simplify use, to decrease side-effects and increase efficacy, to ensure cultural acceptability and to keep manufacturing and distribution costs to a minimum. These same objectives have guided the search for new methods which, in addition, will fill the most obvious current gaps in contraceptive technology.

Traditional behavioural and locally applied methods

9. A simple and cheap method for the accurate prediction of ovulation would greatly improve the reliability of the rhythm method, which is based on abstinence from intercourse during the period when a woman might conceive. Relatively little attention is being given to developing the materials required (e g., a substitute for the thermometer), in spite of the considerable advances made in understanding the biology of ovulation and the menstrual cycle.

10. The controlled induction by a drug of monthly release of the ovum from the ovary represents another approach to rhythm contraception. The recent isolation of additional hormones involved in the regulation of ovulation urgently requires to be applied towards this end.

11. For condoms, emphasis has been placed recently on presentation (e.g , colours) of the product, and on facilitating use by packaging pre-lubricated condoms. An attempt to substitute plastic for latex in their composition has met with little success.

12. Some effort has gone into developing dissolving films for applying intra-vaginally spermicidal agents. One of the versions that is currently being tried out is a 2-inch square of film that can be either inserted manually into the vagina prior to intercourse, or carried into it by placing the film on the penis. Further study is required to determine its efficacy. It also suffers from the disadvantage of requiring continued motivation to fertility control

13 To over-come this drawback, research is currently under way on vaginal rings that release anti-fertility drugs over an extended period. Such devices could be inserted and removed by the user, and their effectiveness could last for a period of a month, or even longer. Different drugs and plastic rings need to be studied The action of the drugs might be to inhibit ovulation or to stop sperm from entering the uterus

14 Closely related are early research and development efforts on intra-cervical contraceptive devices (ICDs). The aim is to produce a device that can be retained in the cervix for prolonged periods of time without blocking menstrual flow; and that will, by its physical properties, or if medicated, disrupt the movement of sperm through the canal

15. ICDs and vaginal rings have the potential advantage over IUDs of requiring less skill for insertion

Intra-uterine devices

16 Continued efforts are being expended to modify the size and shape of IUDs and the composition of their materials in order to increase their effectiveness, lower expulsion rates and to reduce associated pain and bleeding Unfortunately, only very few of these devices are being studied in comparison with one another.

17. Another line of research and development in IUDs is to use them as carriers for chemical substances or drugs which exert the anti-fertility effect. The smaller size of these "second generation" IUDs, as compared with the devices currently in use that exert their effect through their mechanical properties, facilitates insertion and reduces the frequency and severity of side-effects. The most promising and best studied of these new devices is a T-shaped plastic IUD that carries a small quantity of copper.

18 Devices that release drugs in the uterus illustrate a current trend in contraceptive research. Increased [illegible]

local release reduces side-effects, since it permits the use of much smaller quantities of drugs and essentially restricts the drug to a single organ or tissue.

19. Research on these improved delivery systems for contraceptive methods is not limited to IUDs (see paras 13 and 14 above). It requires a considerable development effort at the bio-engineering level, partic-

ularly with respect to evolving safe plastic materials and polymers that permit controlled release rates of drugs in the body.

Oral contraceptives

Modification of "the pill"—combined preparations

20. A variety of different quantities and combinations of hormonal steroids are included under the generic term "the pill". Dramatic reductions in the amounts of the substances have, without impairing the efficacy of the preparation, been achieved over the past 15 years: for example, the progestogenic component has been gradually reduced to a twentieth of the original dose. The reductions in the amount of the substances have been accompanied by a considerable decrease in side-effects. It has been established that the risk of thrombo-embolism is significantly less at lower oestrogen doses and the same applies to several of the minor side-effects. Current clinical research continues to assess the possibility of still further reductions in drug dosages. At the same time, investigations are focusing in greater detail on the side-effects that each of the components gives rise to, either individually or in combination.

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28. Since second-trimester abortions present increased health hazards, much greater efforts are being expended on exploring the use of prostaglandins for induction of abortion during the first trimester. A major objective is the development of a prostaglandin "pill" which might be taken either monthly on a regular basis, at the time of expected menstruation and without any attempt to find out whether pregnancy has occurred, or would be reserved as a "back-stopping" method for those months when menstruation was delayed and pregnancy suspected. Modified prostaglandins, so called "analogues", appear to be more effective than the naturally occurring substances and considerable research efforts are focusing upon them.

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Sterilization

In women

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[illegible]traceptive drugs for men

[illegible]4. Research and development of contraceptive [illegible] for men is receiving disproportionately little attention. Part of the reason may well be the fact that there are fewer steps in the male reproductive process susceptible to regulation: sperm production in the testis, sperm maturation and transport in the sperm ducts. To date, all drugs shown to inhibit sperm formation have been associated with undesirable side-effects, particularly on libido. To overcome the latter effect, the use of testosterone, the male hormone, in combination with other contraceptive agents is being explored in the form of pills, injections and implants under the skin.

35 Another approach is the search for compounds that interfere only with the maturation of sperm and not formation of sperm

Other approaches

36 The idea of a vaccine that would immunize against the formation of ova or sperm, or against the initiation or maintenance of pregnancy itself, has for a long time held much appeal. Although this approach has met with some success in animals, the vaccine preparations have not been of sufficient purity to allow use in humans The questions of reversibility, effects on other organ systems or long-term effects have so far remained unresolved Recent advances in the isolation of purified proteins of the reproductive tract have renewed interest in the immunological approach.

37 The search for new methods is continuously being extended. For example, it was found, first in insects, then in mammals, that the smell of certain substances given off by one sex affected the reproductive processes and behaviour of the other. In rodents, for instance, ovulation and implantation can be inhibited by volatile substances released by some males. The ubiquity of these substances in the animal kingdom, including primates, is stimulating research on their application in the human.

Steps in developing new methods

Characterization of methods

38 Most drug development begins with little consideration of the acceptability of the measure to the person who is to use it Solid consumer research has been lacking to define the attributes of the methods that affect their potential use in different socio-cultural and economic settings and towards which biopharmacological research should be directed. Among the major obstacles to this research is that there are very few scientists concerned with the biosocial aspects of fertility control and that the methodology for these studies is still in its infancy.

Identification of reproductive processes amenable for control

39 Having decided on the types of contraceptives to be developed, the next step in a systematic programme is to identify one or more events in male or female reproduction that would lend themselves to regulation by the method. Although considerable

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required research and development is also hampered by shortages of skilled personnel in some areas, such as experimental and clinical pharmacology, bioengineering, clinical trials methodology and epidemiology.

49. Some consider that the insistance on absolute freedom from side-effects is unrealistic, in that any therapeutic agent is likely to be associated with side-effects. The question becomes one of relative risk in which the incidence of side-effects from a given method must be compared with risks from alternative methods or from unwanted pregnancy

Acceptability and marketing

50. It is obvious that the acceptability and successful use of a method will depend upon many factors, including, to a large extent, the sources or services from which it may be obtained. This involves considerations of use in family planning programmes and operational questions that are dealt with in a later section of this paper. However, certain characteristics of products, such as their size, colour, taste and form, may considerably affect the acceptability of a method Research on these attributes is carried out through marketing studies and constitutes the end stages of the development process

Organization of research on methods of fertility regulation

51. Research and development on methods of fertility regulation are currently carried out in four settings: the pharmaceutical industry, universities; government and private research institutes, and various clinical facilities. The approaches taken to research by these different institutions vary considerably

The drug industry

52. Research and development in the drug industry involves a highly organized and directed team effort towards the development of a specific product. This effort is self-supporting and of considerable scale. Attempts are made to monitor it carefully from stage to stage. Industry, however, in general has no facilities for clinical assessment and relies on clinicians in university and other hospitals and on private practitioners for the clinical trials, largely on an *ad hoc* basis With the increasing requirement for long-term toxicological studies, industry has also begun to contract out this work to specialized concerns.

Universities

53. Research activity in this field constitued a very small part of the universities' total research until about

[illegible]

determined by the personal interests of the senior investigators. This quest for knowledge for its own sake has undoubtedly contributed greatly to understanding of reproductive processes. Some medical schools have also been involved in clinical trials of birth-control methods and in other aspects of applied research. University research, in this field as in others, derives a large part of its support from government sources. Public pressure for more tangible and practical returns for the investment of its funds may well increase the proportion of applied research This changed outlook has also led to recent attempts to bring scientists from different institutions in organized goal-oriented collaborative efforts. These multi-institution "task forces" are directing themselves to many of the steps involved in the development of methods. An attempt is made at the same time to foster collaboration between these task forces and industry A parallel effort is to build up within a single academic institution a multidisciplinary group of scientists concerned with research in this field An underlying assumption to this approach is that greater pay-off may be expected from a larger number of scientists, the "critical mass" concept

54 Support is usually provided in the form of relatively short-term grants and contracts, usually for one or two years Longer contracts may be given to special units, such as those supported by medical research councils Chairs in reproduction have been established in a small number of universities

Government research institutions

55 Contraceptive research and development is found mainly in three types of governmental institutions, those of national medical research councils, of national family planning programmes and of drug regulatory agencies The first are very similar, in structure and scope, to academic institutions The Indian Council of Medical Research, the National Institutes of Health of the United States of America and the Research Institute of the Mexican Social Security Scheme have such specialized programmes They are predominantly interested in problems of general reproductive biology rather than contraceptive development

56 This contrasts with the activities of the few institutions established to provide a biomedical research base for national family planning programmes Here, the stress is on laboratory and clinical studies designed to assess the side-effects of the contraceptives used in the family planning programmes Such institutions are being established, for example, in Pakistan and Iran They may also carry out studies of the mode of action of new methods

57. Lastly, in addition to quality control and testing, the research facilities of a few regulatory agencies are engaged in investigating different approaches to contraceptive toxicology.

Private research institutes

58. Some contraceptive research and development is carried out in private institutions For example, the Biomedical Division of The Population Council (an organization in the United [illegible]

by private foundations and government contracts) has explored a number of ways of improving existing contraceptives and developing new ones. Much of the work on the contraceptive pill took place in another private biomedical institution, the Worcester Foundation for Experimental Biology, which also had an active research training programme in reproduction, as well as undertaking research in other fields.

59. Yet another type of private non-profit making institution has become active in the field. Such institutions use the management approach characteristic of industry and, under contract from government agencies, industry and private foundations, apply themselves to specific problems in contraceptive research and development.

Clinical facilities

60. A good deal of clinical trial work has been carried out in university and other hospitals, family planning clinics and by private practitioners, usually individually, and on occasion within the framework of professional societies. Many of these studies have been well planned and carefully supervised; but, in an appreciable number, efforts have been wasted through failure of the clinician to understand the principles of clinical research.

61. To improve the quality of this important phase of contraceptive development, support is being given to a network of clinical research groups in many countries that have agreed to collaborate in clinical trials using a common protocol. This procedure should prevent the confusion that has arisen in the past when a drug was often assessed through different study designs and it should also serve to indicate quickly the differences or similarities in the response of different populations to a given contraceptive.

RESEARCH ON THE OPERATIONAL ASPECTS OF FAMILY PLANNING IN HEALTH SERVICES

62. The operational aspects of family planning programmes relate to the system of services used to assist or encourage the practice of family planning. Family planning care is one of several basic services which can be made available in combination with health and other community services. The challenge for the health planner and administrator is, therefore, within the limits of his current and potential resources and the time available to him to provide an efficient service. The main operational components of a family planning programme are information, education and clinical services. As in all preventive health activities, information and education about family planning in general, and about specific birth control methods, play a paramount role. The clinical services consist in assisting choice of a suitable method, ensuring its successful use, allowing for changes in methods and, in the event of contraceptive failure, providing adequate management.

63. Operational research on family planning in health services can provide reliable data to aid policy decision making, improve the efficiency of the service, identify local applications of new technology and assess the impact on family planning and health that the services produce.

64. The design and operation of a family planning programme in any one country will be strongly influenced by socio-cultural factors, the level of technology and the presence of infrastructures for information, education, health and commerce. Large-scale family planning services in developing countries represent an attempt to set up services that will reach a large proportion of the population in rural areas which have little in the way of the needed infrastructure. In all instances, however, and despite the fact that family planning represents a new type of social service, the application of fundamental principles of administration and good management will enhance the chances of putting together a successful family planning programme. This may not involve more at the planning stage than a sound approach to the determination of needs, the assessment of resources, the setting of realistic objectives and priorities, and the selection of a strategy oriented to community use of the services. At the implementation stage, it will require resources in terms of personnel and facilities, setting-up of supporting organizational structures and interlacing of family planning with other related activities. From the beginning, provision will be made for an evaluation component to monitor activities in order to suggest improvements and assess end-results.

65. The principles of operations research and systems analysis are currently being used to assist in the formulation and evaluation of family planning programmes. Research questions may arise at any of the steps involved in the setting-up of family planning programmes.

Planning phase

Determination of needs

66. The first step in designing a family planning programme consists in identifying the groups in the population in need of such care. Eligibility for family planning services will be based on such criteria as age or exposure to pregnancy. Certain categories may be considered high-risk groups from the health, economic or social point of view; for instance, the woman whose health would be endangered by a further pregnancy, the family that cannot bear the economic burden of an additional child, and the unmarried teen-ager in whom pregnancy would be socially disruptive. Much of the demographic, social, cultural, economic and health data required will have to be obtained by survey techniques.

67. At this stage, limited research studies may be helpful or essential to solve certain specific issues. It may be desirable, for instance, to quantify more precisely the risk involved in the birth of an additional child to families of a certain socio-economic level, or to mothers of a given parity. The extent of certain birth-

control practices, especially when illegal (for instance, abortion) can be ascertained only by specially designed epidemiological studies The need of target population groups for education about family planning as a whole, as distinct from information on specific methods, may be determined by in-depth behavioural studies.

Assessment of resources

68. The assessment includes determination of manpower, facilities and administrative structures already engaged in family planning services and those which, with additional inputs, might become available Categories of personnel or facilities, already engaged in closely related activities, may have a potential as resources for the family planning services (e g, auxiliary nurses, maternity wards or pharmacies). Some operations research studies may be needed to determine the additional input required for their involvement in family planning activities and the likely effect on their previous functions.

Setting objectives and priorities

69. Once the assessment of needs has been carried out and resources evaluated, the setting of objectives becomes a policy matter which does not involve research. The objectives will refer to the establishment of different aspects of family planning services (e.g, manpower, clinics, contraceptive supplies) and to the effects expected from them (e g, changes in attitudes to family planning, extent of family planning, improvements in health, reduction in birth rate)

70. It is in the selection of priorities and approaches to meet these objectives that research can play a part Given the inevitable shortage of means, the administrator will have to choose between many alternatives: whether the programme should be directed, in the first place, partially or wholly to urban rather than rural populations, what proportion of the programme should be devoted to education and to clinical services, in a programme designed to reduce birth rates, whether priority shoud be given to older or younger couples; the amount of total resources that should go to training manpower and the amount to delivery of services; the stage of the programme at which coverage should be extended to additional communities.

71. A more rational basis for the decisions required can be provided through the use of a number of new analytical research tools. These tools permit taking into consideration the impact and interaction of several variables, such as estimated feasibility, the effectiveness of measures taken and the numbers of persons affected by them, cost and need These same techniques may be valuable in the quantification of priorities, e g, the number of abortions it is desired to prevent.

Selection of approaches

72 Epidemiological, behavioural and operations research will all have to play a part in the selection of approaches for the programme, e g, the choice of birth-control methods, the media for education, the settings for services, the personnel to provide clinical care and the integration of family planning care with other health activities

73. A number of family planning programmes have run into considerable difficulties because they did not determine which birth-control methods were acceptable to the population Little social science research has been conducted on the image and associations that people of different cultures have of different methods of birth control. These may often prove to have little relation to the true nature of the contraceptive agent, but this perception will, nevertheless, be a main determinant of its rate of adoption Such research might eliminate some methods from current inclusion in the programme; more often, it will point to areas where an added education effort is required or where confusion of popular terminology is proving a handicap

74 The selection of methods should be preceded by carefully conducted programme trials that focus on the implications for services of particular methods For example, although the incidence and types of side-effects from a particular method will usually have been first determined in a hospital-based study, the importance and interpretation given to side-effects may vary greatly when the method is used on a wider basis in different populations The extent to which even seemingly minor side-effects may influence continuation of use can be determined in such programme trials, which will also serve to define appropriate measures for their management At the same time, these trials can address themselves to a whole series of problems that may affect the use of the method in the programme: types of personnel required for particular methods, the kind of instruction that will ensure successful use, the frequency of follow-up needed, and the best design for record-keeping

75 At an early stage of the programme and before decisions for large-scale implementation are made, [illegible]

activities, such as maternity care, would appear to be [illegible]

potential value for family planning education of the schools, the general store, social clubs and community development projects can be explored and brought into the health education programme

76. Since the development of large-scale programmes, a major point of strategy that has been debated are the ways in which the private health sector should be involved. The data on which such decisions should be based are rarely available for the private sector from standard record sources Pilot studies on the readiness of the public to use private clinics, mobile units, the health services of industry, general practitioners or the family planning clinics of voluntary

family planning associations will document the potential value of these several approaches.

Implementation of programme

77. When a strategy has emerged from the analysis of available information and the inputs from research, more complex pilot studies, bringing together the various elements entering into the programme, are most useful. Local situations vary so much that it is usually inadvisable to base programmes solely on experience in other countries or other cultures. A pilot project under realistic conditions permits rational programme development and eventually saves both time and money. Pilot studies have been criticized for their lack of replicability. This criticism is in part justified since, in many instances, insufficient attention is given to research design permitting comparisons and to collecting the necessary data to allow interpretation of findings.

78. Research may be needed to guide implementation of the programme within the constraints of the strategy and the available resources. The methods of operations research and systems analysis will serve to identify alternative approaches and ways of optimizing performance. A typical question that might be investigated is the responsibilities (e.g., for contacting women or for inserting devices, distributing pills, following up patients) and workloads to be given to different categories of manpower (e.g., doctor, nurse, auxiliary) in a health service to achieve a given family planning objective. The same activities and tasks in different countries may have to be performed by different categories of personnel and in different health service settings. Another type of problem that may call for operations research relates to the establishment of a system of supervision or of referral between outlying facilities providing basic health services, including family planning and central more specialized resources. Yet another focuses on the relative merits of bringing to the patients family planning care with other essential health services rather than waiting for individuals or couples to come to the health facilities. On a more narrow scale, even such routine procedures as appointment-making or directing the flow of women through a clinic can be considerably systematized when the results of time and motion studies become available.

79. There is also a need for research into the value to a family planning programme of monetary or other forms of incentives, whether provided to the client, or those providing services. Such incentives have been introduced in several large-scale family planning programmes and in some cases account for a substantial part of the budget.

80. One of the indirect benefits of operations research is that it necessitates statement of the outcome in measurable terms. One should recognize, however, that insistence on a quantitative approach may serve to mask the important role that the human element plays in providing family planning care.

Evaluation of programme

81. There has probably been greater insistence on evaluation of family planning programmes than of other health or social activities. This may be due to the newness of family planning programmes, their size and cost as well as to the interest of demographers in these programmes. This evaluation has tended to emphasize the outcome of a programme, e.g., numbers of persons "accepting" a particular method, or changes in birth rates. There has been a relative neglect of evaluation of the operational aspects of the programme, although it is becoming increasingly accepted that such evaluation should be built into the programme from the beginning.

82. The extent to which services are used can be ascertained through routine service statistics in which numbers and certain characteristics of users are recorded. Under-utilization of services or unexplained patterns of use may often only be understood following special studies. One of the major problems in family planning is discontinuation of use of a method and non-return for scheduled revisits. Studies of such "terminations" will help indicate where the causes lie: in the accessibility of the services; the timing of clinics; the inappropriate locations of a service; the cost of the service; the attitudes of personnel. The study may reveal that the causes are unrelated to the services or that terminators are obtaining family planning care elsewhere. Careful studies of utilization may also reveal a residue of unserved clientele for which different service approaches may have to be developed.

83. Another important contribution of research to evaluation is to help identify simpler indexes of the factors likely to be significant and to develop methods of quantifying them.

Organization of operations research

84. Compared with research on contraceptive technology, the resources available for research on family planning services are meagre. Only a few sociologists, psychologists, statisticians, demographers etc. have been involved in selected aspects, and only in a small number of countries. Unfortunately, extremely few epidemiologists, operations research experts or health service analysts have given attention to such research.

85. It has mainly been carried out in research units within government family planning programmes, by university departments and schools of public health, demographic institutes, institutions for rural and community development, private organizations working in the field of population and family planning, business schools and a small number of operations research firms.

A STRATEGY FOR RESEARCH

86. Clearly, many problems exist in family planning programmes that cannot be resolved except through research. The crucial issue then becomes one of develop-

ing an appropriate and realistic research strategy. Some of the considerations that enter into the development of research strategy may be illustrated for the two main areas of research covered in this paper.

The importance of research

87. A basic premise is the acceptance of the [illegible]

not only are of immediate application to social development, but are intellectually challenging. The broad scope of the subject areas required has already been mentioned It includes social research on the acceptability of methods of contraception, the many disciplines of reproductive biology and clinical pharmacology and the various techniques of epidemiology and operations research These areas have not yet attained recognition as priorities by national science policy bodies, medical research councils and universities Even industry, which a decade ago appeared to be expanding its programme of contraceptive development, is cutting back its expenditures.

Reorientation towards the needs of developing countries

88. A major reorientation of the whole area of research towards the specific needs of developing countries will also be required So far, little attempt has been made to base programmes of research in contraception on methods suitable or acceptable in the social, cultural and economic settings of these countries. For example, in spite of the evident ease of handling long-acting injectable contraceptives and their apparent acceptability to many women, little interest is shown by the drug industry in improving the existing preparation or developing new compounds. In general, popularity of existing methods in developed countries and the current profits derived from their sales appear to have provided little incentive to industry for further research on new modalities such as contraceptive drugs for men or contraceptive vaccines.

89. It is quite evident that public funds will be needed to subsidize drug development and related research. One of the most economic uses to be made of existing expertise may be to bring into collaborative efforts scientists from universities, other research institutes and industry. The latter certainly has the best resources for certain stages of drug development. Financial arrangements can be made that will protect the use of public funds and meet the interests of these enterprises, as well as the interests of developing countries.

90 Research on the operational aspects of family planning in developing countries has similarly been restricted in magnitude and often has been hampered by the application of models derived to fit situations in developed countries.

91. It would appear that the only way to set up a programme of research reoriented to the needs of developing countries is through a concerted effort involving collaboration on an international scale and the conduct of research in both developed and developing countries.

Collaboration in research between developed and developing countries

92. The most difficult part of any research is to ask the right question and this first step will be taken in the developing countries themselves It will cover defining the properties of potential methods that make them acceptable to a particular population and identifying specific obstacles to the use of family planning services in a community. This information provides the basis for setting the priorities for national and collaborative programmes of research

93 In contraceptive development, collaboration between developed and developing countries is essential, but will vary in degree at different stages of the research In the short-term perspective, and while resources are limited, much of the early work on physiological processes and synthesis of compounds will be carried out in laboratories in developed countries Any clinical assessment will have to be done in both types of countries simultaneously. This procedure should avoid the difficulties encountered with the "pill" in the past, when the compounds and doses determined as effective and safe for the women of developed countries were assumed to apply equally to women differing in size, weight, nutrition, ethnicity and disease pattern.

94 When the stage of programme use of a method has been reached, research in the developing country will be required to determine the service implications For these studies, expertise and some of the management techniques from developed countries may be valuable However, modification may be required of existing research instruments to fit conditions in which it may be difficult to collect data At the same time, it may be necessary to establish in rural areas health service research groups that would study in depth and over several years the changes brought about at various levels of family planning and other health and social services This longer term approach to operations research has seldom been attempted in developing countries

95. In fact, a global programme of research on methods and on services is likely to include a mix of projects having different time-frames Short-term projects will have a certain appeal, but it should be realized that their applicability may be somewhat limited. For methods, for instance, short-term research [illegible]

longer term investment, high risks but potentially higher pay-offs in terms of acceptability and use. Similarly, for operational aspects of family planning, short-term research will, it is hoped, remove some blocks in current service structures, but a longer time-span will be required to elaborate new approaches appropriate to the urban or rural patterns of the develo ing

Resources for research in developing countries

96. A *sine qua non* for the world-wide research effort needed is the build-up of resources for research and technology in developing countries. This will redress the current gross imbalance in scientific expertise between developed and developing countries and will equip the latter to identify their own priorities, select and adapt technology from elsewhere and participate in the development of new techniques and approaches. Here again, a strong argument can be made for training, in the first instance, manpower that can address itself to research currently under way in developing countries—for example, clinical trials of contraceptive methods or studies of under-utilization of services. At the same time, however, a beginning should be made in training some scientists for more fundamental aspects of these problems while the facilities for such research are being developed. This will eventually lead, at a regional level at least, to the study of all aspects of local problems by talent so far untapped. These resources will also serve to enhance the quality of university education needed to produce more scientists and technologists who will carry out research on fertility control methods and family planning care. These objectives are simple to state, but difficult to achieve. They will require considerable efforts and reorientation in developed and developing countries in terms of long-term commitment of considerable funds, of manpower and in rethinking of existing structures for research.

Funding for research

Biomedical aspects of fertility regulation

97. Fairly accurate estimates are available of the annual over-all funds for support to contraceptive research and development, including reproductive biology. In 1972, they amounted to approximately $50 million from industry, another $50 million from research agencies and institutions in the United States of America and no more than $25 million from other sources.[3] Although some countries have recently increased governmental contributions to contraceptive research, the total sum allocated in this area is dwarfed by the sum allocated to other forms of biomedical research. The major part of the government funds comes through the channel of the medical research councils, but technical assistance agencies of several countries also now devote part of their budget to this problem. Some funds are also channelled through multilateral sources such as the World Health Organization (WHO) and the United Nations Fund for Population Activities (UNFPA).

98. These increases may, to a certain extent, be neutralized by the gradual withdrawal of industry from this area of research, due to the alleged high commercial risk. To maintain the momentum of industry in certain countries, government funds have been made available in the form of limited research contracts. This use of public money inevitably raises questions of patent rights. Some leaders in industry have urged more flexible royalty arrangements, whereby new products developed by government funds would be provided on a cost basis in the public sector and would allow a profit margin in the private sector. A few drug manufacturers have gone so far as to suggest programmes of shared risk between government and industry, especially for toxicological and clinical studies. The research potential of industry might also be tapped, through government subsidies, to develop so-called "non-commercial products", i.e. cheap, non-prescription drugs and devices, an area in which the drug industry is unlikely otherwise to show much interest.

Operational aspects of family planning programmes

99. There are no accurate estimates of annual expenditures on research in the operational aspects of family planning programmes, but it is unlikely to exceed $10 million.

100. The funds needed for research on the operational aspects of family planning care will represent only a small proportion of the cost of these programmes. Unlike contraceptive development, its findings are likely to be limited to the local situation. Facilities for the handling of large amounts of information and for analysis of multiple variables will be needed for many, although by no means all, of these studies.

Future funding requirements

101. Feasibility studies have shown that, internationally, a considerable potential exists for an immediate expansion of research in both biomedical aspects of fertility regulation and the operational aspects of family planning programmes. In the longer term, the development and strengthening of research capacity within individual countries will also require additional funds on a continuing basis. A doubling of the actual level of funds for reproduction and family planning research, to about $250 million per annum, would more completely take advantage of existing international talent, broaden the research base, provide a preliminary solution to at least some of the technological problems and permit some building up of national expertise. Continued funding over a 15-year period should be envisaged. Subsequent adjustments would be based on reassessment of needs, priorities and the enhanced capacity to undertake research.

102. Any strategy for research is very largely determined by the level of funding available, which will influence decisions concerning the mixes of directed and non-diretced research, of short- and long-term pay-offs, of investment in research training, of directing efforts to male or to female contraception and of different methods. The over-all level of funding available will, in itself, be a reflection of the importance given by society to this problem, just as the development of effective antimalarial drugs or travelling to the moon reflected other priorities and led to those achievements.

[3] Figures for China are not available.

Programme of research of the World Health Organization

103. For the sake of brevity, only those aspects of the WHO research programme in human reproduction which bear directly on the biomedical aspects of fertility regulation and on operations research on family planning programmes are described below, although many of its other research activities, for instance, studies on infertility or pregnancy, relate to them indirectly.

New methods of birth control

104. The strategy adopted in the WHO programme of research on new contraceptives, intensified in 1972, involves several considerations: the demand by member States for a variety of safe and effective methods within a reasonable period of time; the limitation of funds for such research, the intent to complement ongoing efforts supported by other agencies and by industry; the unique position of WHO in fostering collaboration between scientists and institutions in many countries.

105. This part of the WHO programme mobilizes existing expertise in this field and, given the need for sophisticated technology, involves scientists in many developed countries as well as in developing countries. It is funded through special donations, amounting in 1973 to $6.4 million At this stage, several goal-oriented collaborative research projects, directed to most of the areas described in earlier sections of this paper, have been initiated. These "task forces" in contraceptive research and development constitute a major approach in the programme and in some cases involve both industry and academic research institutions.

106. The need for extensive clinical trials of new contraceptive methods has already been described and has proved a major obstacle to development in this field. The WHO programme provides support to a network of clinical research groups in many countries that have agreed to collaborate in trials using common protocols. These multicentred trials should serve to indicate quickly the differences or similarities in the response of different populations to a given contraceptive and to avoid the confusion that has arisen in the past when a drug, such as the "pill", was assessed through different study designs.

107. Efforts have also been made to build up, within single institutions, multidisciplinary groups of scientists and to remedy, through research training, the shortage of skilled personnel in some areas, such as clinical pharmacology, bio-engineering and clinical trials methodology.

108. This whole programme of research in new methods is closely co-ordinated with the continuing and expanding WHO programme on other aspects of family planning described below.

Effectiveness and safety of existing methods of fertility regulation in developing countries

109. The modern methods of fertility control, especially the hormonal steroids and IUDs, have been developed and tested in women from more developed countries It has been assumed that the same dosage of these drugs or shape of the devices would be equally suited for women from less developed countries in spite of the fact that these women differ in body size, diet, [illegible]

[illegible]

infections and infestations Lack of national research and expertise on these questions has held back authorities from making available a number of contraceptive modalities This reluctance has been accentuated by the ambiguous and harmful effects found at times in some Western women.

110. The WHO programme is directed not only to supporting studies on these problems, but to establishing the relevant national expertise to carry out such studies on a continuing basis. Major programmes are under way in Egypt, India, Iran, Pakistan, Thailand and Turkey

Patterns of family formation and health

111. Different patterns of family formation, in the [illegible]

[illegible]

of the family. Studies carried out so far in developed countries have shown the considerably higher mortality and morbidity of older (over age 30) higher parity (over four) women and their offspring This finding, in itself, constitutes a solid rationale for family planning. It is noteworthy that provision of family planning care for the high-risk groups will have a considerable impact on limiting population growth since they contribute up to 50 per cent of all births in less developed countries

112. The associations between health and different patterns of family formation need to be examined in a variety of developing countries, in order to provide bench-marks for the family planning programme. Moreover, these studies serve to indicate causal relationships around which interventions by the family planning programme and related services may be made most effectively. A related area for investigation is the extent to which decisions concerning the practice of family formation are influenced by real or anticipated infant [illegible] particularly in developing countries

[illegible]

between family formation and health now involves Colombia, Egypt, India, Iran, Lebanon, Pakistan, Philippines, the Syrian Arab Republic and Turkey.

Induced abortion

114. Research on induced abortion represents a priority area both in settings where it is practised illegally and in the many countries that in recent years have legalized termination of pregnancy. In the former group, well-designed public health studies, by showing the magnitude of the practice and its associated mortality, morbidity and financial costs to government services, will serve as a basis for instituting family planning activities. Where abortion has been made

available, authorities have raised many questions, such as the relative merits of various methods for termination at different stages of pregnancy, the dangers if any of repeated abortion, the staff and facilities required for different methods and the interrelations between provision of abortion and use of contraceptive methods.

115. Between 1966 and 1970, a small number of studies were initiated by WHO, either focusing specifically on induced abortion, e.g., in Brazil and Czechoslovakia, or collecting data on abortion as part of a wider community study, e.g., in Peru and Senegal. The WHO has now initiated a series of carefully designed studies on the short- and long-term *sequelae* of different procedures for termination of pregnancy.

Programme trials of methods of fertility control

116. The inclusion of any method of fertility control in a national family planning programme should be preceded by carefully conducted programme trials. These trials permit an assessment of the reactions of the population to the method when used outside the carefully supervised setting of the clinical trial. At the same time, they bring into focus the implications for services of the method. The extent to which even seemingly minor side-effects may influence continuation of use can also be determined and feasible measures for their management defined. Moreover, these trials will address themselves to the specific service needs of the method. These may range anywhere from choosing the appropriate terminology to present the method in a given cultural setting, to selecting the types of personnel required for particular tasks involved in management, the kind of instruction that will ensure successful use, the frequency of follow-up needed and the best design for record-keeping.

117. The set-backs encountered in a number of family planning programmes can in part be traced to failure to conduct such programme trials. To provide, therefore, a sounder basis for family planning programmes, a programme of studies on this aspect is being organized. Some of this research will be done on a collaborative basis; the similarities and differences that should emerge might help in identifying generally applicable approaches as well as the distinctive requirements of particular situations.

Family planning behaviour and practices

118. The successful implementation of a family planning programme depends ultimately upon the extent and consistent use by individuals and couples of birth-planning practices. The factors that motivate them in this regard include social prescriptions on parenthood, cultural considerations affecting conjugal relationships and sexuality, and values attached to children. Base-line data on these factors obtained in research studies in different communities are essential to the development by health authorities of appropriate informational, educational and clinical services. The biosocial approach to such research provides health authorities engaged in family planning with the appropriate orientation for reinforcing, or even changing, patterns of fertility control practices.

Problems of organization and administration of family planning care

119. In assisting Governments in developing family planning programmes, WHO has been faced repeatedly with the need to decide between alternative approaches. To avoid the set-backs caused by arbitrary decisions, some research is urgently needed, especially in view of the newness of family planning and in the face of considerable constraints in terms of availability of national staff and facilities. A variety of new analytical research tools, such as systems analysis, may be particularly useful in this regard.

120. The programme of research to be undertaken under this heading addresses itself to such questions as:

(*a*) The responsibilities (e.g., for contacting women, or for inserting contraceptive devices, distributing pills, following up patients) and workloads to be given to different categories of manpower (e.g., physician, nurse, auxiliary) in a health service to achieve a given family planning objective, though the same activities and tasks in different countries may have to be performed by different categories of personnel and in different health service settings;

(*b*) The integration of family planning functions and administrative structures with those required for other priority health activities, such as general maternity and child care: this aspect may be particularly important in the commonly encountered situation where only peripherally based auxiliaries are available to provide minimum comprehensive health care, including family planning;

(*c*) The establishment of a system of supervision or of referral between outlying facilities providing family planning and central more specialized resources;

(*d*) The merits of bringing to the patients the bulk of family planning services rather than waiting for individuals or couples to come to the traditional facilities;

(*e*) The readiness of the public to use private clinics, the health services of industry, general practitioners or the family planning clinics of voluntary family planning associations.

121. Pilot projects on these problems carried out under realistic conditions and at decision points eventually save both time and money.

122. Some support has been given by WHO to a study in rural India on the provision of family care in various combinations with health activities. The WHO also is becoming involved in a large-scale rural family planning/maternal and child health research project in Tunisia, and, in collaboration with the Population Council, in another similar project in the Philippines. It is also in the second year of a health planning research project, involving an entire province in Iran, that focuses on the place of family planning in the general health structure.

NEW DEVELOPMENTS IN THE REGULATION OF HUMAN REPRODUCTION

Sheldon J. Segal *

1. Methods of fertility control are available which can be highly effective in particular circumstances. Yet, for most parts of the world, the dawn of an era of effectively used contraception is still awaited The status of research towards new methods which could hasten this event can best be viewed in the light of the recent past. Twenty years ago, clinical testing of an oral contraceptive had begun in the United States of America, Mexico and Puerto Rico Within a few years, the original "Pincus Pill" was introduced and the search for competing products became a high priority for the commercial sector around the world. Apart from new versions and lower doses of the original "pill", contraceptives introduced since 1956 have been modern intra-uterine devices (IUDs), sequential pills, mini-pills, vaginal foams, coloured condoms and, in some countries, injectable progestins. In this list, only modern IUDs have taken a place alongside "the pill" as a major development, adopted by millions around the world Both of these so-called "modern" methods, however, have limitations and disadvantages. Each requires an advanced health establishment to be used most effectively. The pill is associated with both troublesome minor side-effects and rare, but serious, major risks IUDs, in general use, require insertion by a skilled health worker, are frequently not tolerated by women who begin using the method and also carry the risk of serious consequences in rare cases.

2. Beyond these issues, the success that couples achieve with current contraceptives is far below usual expectations. This is true even in those countries with conditions of literacy, health services, transportation and communications which would facilitate proper utilization of a method selected for use. In the United States, for example, where the rate of use of contraception is high, one third of couples using contraceptives have an unintended pregnancy within five years This means that, for most couples depending upon reversible contraceptive methods for many years after the completion of the desired family size, it is just a matter of time before an unintended pregnancy can be expected. The limitations of contraceptive technology certainly contribute to the high legal abortion rate in many countries, when this choice is provided to women. In a sense, research towards improved contraceptive technology is a search for abortion-prevention therapy, as well as an effort to provide more acceptable, effective and safe methods for the world's population.

3. Contraceptive development depends upon the understanding of physiological mechanisms concerned with conception, basic studies in animals and human subjects to establish effectiveness and safety factors and, ultimately, acceptability studies in various social and cultural circumstances. The total process is lengthy and complex, so that any new methods likely to emerge in the near future must currently be at some advanced stage in the development process. Certainly, some extent of testing in human subjects must have begun Based on these criteria, the following "new" or "modified" contraceptives may be developed within from three to five years from now.

METHODS IN CLINICAL TRIAL

Methods for use by men

A combination-steroid method to arrest sperm production, based on oral, injectable or subdermal implant routes of administration

4. Tests in men have established that it is possible to suppress sperm production while maintaining normal levels of plasma testosterone, and that this procedure is readily reversible. Demonstrating that this combination of results can be achieved is a major breakthrough equivalent, for example, to the first observations that ovulation suppression and acceptable bleeding patterns could be obtained with steroid combinations in women (leading subsequently to development of the pill). From here, work has to proceed in two directions. (1) applied research and development to select the best combinations of progestin and androgen among those now available and the best routes of administration; (2) basic study in animals and humans on various issues of safety and potential side-effects.

5. The type of reversible method that is a feasible outcome of this work is a biodegradable implant of androgen that would last one year or longer, supplemented by a weekly pill or a semi-annual injection of progestin The possibility of a double-implant (androgen and progestin) method lasting a year or longer at a time is more uncertain, but not out of the question.

Arrest of sperm production by tri-monthly injections

6. At least three compounds have been tested in small numbers of men and have proved to suppress

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spermatogenesis. The potential problems are a loss of libido or development of genecomastia when progestins are used and medical anxiety over metabolic disorders or cardio-vascular hazards when potent androgens are used. Yet, this approach is sufficiently promising to warrant the study of several synthetic steroids and their esters for spermatogenesis inhibition free of unacceptable side-effects.

An anti-androgen to prevent epididymal sperm maturation, based on oral or subdermal implant routes of administration

7. Tests in a limited number of men have been begun based on an observation made in rats given an anti-androgen by subdermal implant. In those studies, epididymal sperm failed to achieve the motility that normally occurs, and the animals were rendered infertile, without loss of libido. Although the subdermal implant route of administration would not be feasible in men to achieve systemic activity by way of the circulatory system, the possibility of local action by implants placed in the scrotum, contiguous with the epididymidis, cannot be ruled out.

Reversible vas *occlusion*

8. Currently under clinical study are several removable clips that can be applied to the *vas deferens* through a small scrotal incision and at least two devices which, by a more complicated procedure, can be placed within the *vas*. One of these is a simple plug made of polyethylene, which is designed for subsequent surgical removal, if desired. The other is a micro-valve intended to be left permanently fixed within the *vas*, with a simple manipulation making it possible to place the valve in either an open or closed position, as desired. No fully satisfactory clip method has yet emerged; those tested thus far either fail to close the *vas* or cause necrosis of the underlying tissue. Plugs so far tested have the same disadvantages.

*Intra-*vas *device*

9. An effort to cause sperm necrosis or immotility by placement of a non-occlusive foreign body in the *vas deferens* has been tested clinically, with only partial success. In this first experiment, involving close to 1,000 volunteer subjects, surgical silk was suspended within the lumen of the *vas* and fixed loosely to the perivasal surface to facilitate subsequent removal. Now, experimenters are beginning trials with pharmacologically active intra-*vas* foreign bodies, including copper or zinc filaments. The effect in animals of these metal ions is to immobilize sperm or to cause head-tail separation. The first tests in men are based on observing these morphological characteristics of ejaculated spermatozoa. Even if these trials are successful, it will be some time before contraceptive effectiveness tests could begin, since difficult issues of teratology are involved when there is a possibility of partial damage to sperm.

Methods for use by women

Long-term injectable progestin

10. Two compounds have been sufficiently used to have been marketed as tri-monthly contraceptive injections in some countries. They work by suppressing peaks of luteinizing hormone release, thereby preventing ovulation. Bleeding patterns with each compound are erratic. Most women, after experiencing irregular bleeding at first, tend toward amenorrhoea. Each compound has important issues with regard to safety and reversibility still unresolved. With increasing level of use, these issues should be resolved within three years. Meanwhile, searches for other compounds that can be used safely as injectable contraceptives and for delivery systems that will provide slow and constant release of progestins from the site of injection are proceeding. One clinical trial has begun with a biodegradable inert carrier which is slowly hydrolyzed, thus releasing the loosely bound progestin molecules.

Subdermal implants of progestin

11. This new method of contraception has been proved effective for periods of at least one year and is in an advanced stage of product development. In its current form, the method requires the insertion and removal, under sterile conditions, of Silastic tubes or rods containing the anti-fertility hormone. Several progestins have been tested, but the optimal compound has not yet been selected. Meanwhile, clinical trials are proceeding with eight different compounds, involving the use of one to six implants. In addition, the first biodegradable implants have been developed and will probably be placed in clinical trial by 1974.

Intra-vaginal ring containing progestin

12. Comprehensive work has been completed to establish that the absorption of progestins through the vaginal mucosa can be used as the basis for ovulation suppression. The contraceptive effectiveness and acceptability of a product based on this principle are now being studied in field trials; three different progestins are under investigation. The compounds are incorporated into Silastic and moulded into the form of a ring, similar to the size and shape of the rim of a vaginal diaphragm. The ring can be inserted by a woman and left in place one month or longer. Studies are proceeding on the basis of leaving the ring in place for one month, for two months or for the entire interval between spontaneous bleeding periods. This new method is undergoing product development, with engineering and design modifications in progress to reduce cost and to standardize monthly steroid-release rates.

Contraceptive bracelets containing progestins

13. Absorption of steroids through the skin, a principle long employed for cosmetic purposes, is now being tested as the basis for contraception. The current preliminary tests in women involve the use of Silastic

as the carrier of progestin, in the form of a snugly fitting arm bracelet. The clinical tests are being carried out with three different compounds and with two different forms of Silastic bracelets The work needed to develop the contraceptive bracelet is mainly of a product design nature and subsequent clinical testing. The principle of steroid administration by this route is sufficiently established. Feasibility for contraception depends upon a design of bracelet which will provide a sufficiently constant rate of absorption.

New intra-uterine or intra-cervical contraceptive devices

14. Limited or extensive trials are in progress with at least seven new types of intra-uterine devices and one that is designed to remain within the cervix. Several of these incorporate the principle of using the IUD as a carrier for an anti-fertility agent that acts locally in the [illegible] a non-steroidal [illegible] :es" are most [illegible] ble generally by 1974. They are already on sale in several European countries; and one of them, the Copper T, is about to be introduced in India in a large-scale field programme There are several versions of the Copper T under test. The one tested longest, the TCu 200, can be left in utero for at least two years, but probably not longer than four in order to maintain maximal effectiveness. This time limitation is overcome with newer models, which may also have a higher contraceptive effectiveness than the TCu 200. The other form of copper-carrying device (the Copper 7) probably performs similarly to the Copper T, although until now, this device has been designed and tested for replacement every year, thus making it less appealing for public sector use, particularly in developing countries. The progesterone-releasing IUD (also in the form of a T-shaped plastic device) has a similar limitation in effective time span Current technology permits the device to release the hormone for approximately one year and this is the version that is being tested. The contraceptive effectiveness of this device has not yet been established Although some women have used intra-uterine foreign bodies containing various non-steroidal anti-fertility agents, this experimentation is at an early stage. Neither the form of the carrier nor the precise chemical to be used for large-scale testing has been selected.

15. The hopes for improved performance of inert intra-uterine devices currently being tested are based on design modifications, the value of which can only be determined by extensive clinical trial. One modification is a three-dimensional form used years ago without having a distinctive performance record, but currently being tested for use specifically in the post-partum or post-abortum uterus. Another employs an accordion-pleated membrane designed to cover a relatively large area of the endometrium surface. Still another is Y-shaped, so as to locate in the uterine angles and impinge upon the utero-tubal ostia. The intra-cervical device under limited test is supposed to influence the cervical mucus in a manner to prevent sperm penetration

Monthly pill or suppository to be used to induce menstruation

16. The few compounds that have been tested as potential orally active luteolytic agents suppress the *corpus luteum* and bring about a menstrual discharge by eliminating the progesterone support required by the endometrium, and, therefore, the initial implantation site. One of these, aminoglutethamide, does suppress *corpus luteum* function, but not sufficiently to bring about the desired effect. This particular compound is not being tested further in women as a menses-inducer, but many of its analogues are being synthesized and screened in animals for possible clinical trial.

17. There was some hope that a naturally occurring prostaglandin, absorbed through a vaginal or rectal suppository, could act systemically to suppress the human *corpus luteum.* This use of prostaglandin $F_{2\alpha}$ and E_2 has been studied without success, but there will be a continuing effort along these lines as prostaglandin analogues are synthesized.

18 Another experimental approach to menses induction in women is the use of synthetic progestins at the mid- or late-luteal phase of the cycle in order to suppress endogenous progesterone production with doses of a progestin which will not, itself, maintain a nascent placentation site. Four synthetic progestins were tested in women and found to cause reduction of *corpus luteum* function, but the effect was not sufficient to overcome the luteotropic action of chorionic gonadotropin. One compound is still being tested in this regimen.

19 The promise of a contraceptive method based on the principle of menses induction, whether or not a cycle has been fertile, warrants an investigative effort of the highest priority. In this approach could lie the solution to the problems of safety associated with continuous dosage forms of hormonal contraception; a solution that could yield near-perfect effectiveness Not only should available compounds be tested, as will certainly occur, but special synthesis programmes should be undertaken to uncover compounds that could be used in this form of contraception.

Monthly pill to cause ovulation suppression

20 One combination of compounds has been tested on a monthly schedule of administration for suppressing ovulation The steroids used are absorbed from the gastro-intestinal tract, stored in adipose tissue and released gradually over a month The results, however, have been sufficiently disappointing that the sponsoring company dropped further product development in the United States of America, and the current limited distribution abroad will probably cease before long. No other compound is being tested on this basis currently, but a concerted search for an anti-ovulatory compound effective as a monthly pill would have good chances of success

Monthly pill, injection or suppository to regularize ovulation as a basis for improved "rhythm"

21. One of the effective fertility drugs, which acts through the hypothalamus to induce ovulation, has been tested in normally ovulating women as a means to regularize ovulation in a predictable fashion. The objective of this study was to improve the contraceptive use of periodic abstinence by causing a precisely timed ovulation. This test was not successful since, with succeeding months of use, the interval between drug ingestion and ovulation increased in an unpredictable fashion.

22. Now that luteinizing hormone releasing hormone (LHRH) has been identified, isolated and even synthesized, the prospect of using this polypeptide for regularizing ovulation in normally cycling women has been put to clinical test. The few cases so far reported indicate the potential feasibility of the procedure and the issues that need further study have been identified. These issues include the potential for multiple ovulations, convenient mode of administration and consistency of response. There may now be a continuous process of synthesizing and testing of LRH analogues both for the purpose of inducing regularized ovulation and with the hope of developing antagonists that would cause acceptable patterns of anovulatory cycles for contraceptive purposes.

Post-coital pill to be used regularly

23. Although diethylstilbestrol is now available to reduce the chances of pregnancy following isolated midcycle exposure, the side-effects and disruption of the ovarian cycle are such as to make the procedure unacceptable for regular post-coital contraception. Two of the synthetic progestins have been tested experimentally as regularly used post-coital pills, but with poor effectiveness and considerable disruption of the bleeding pattern. One has been suggested as a possible "morning-after" pill and the other as a "minutes-after" pill.

24. Several compounds, related structurally to diethylstilbestrol, have post-coital anti-fertility activity in laboratory animals, and three of these have been tested without success in women. Others in this series are available for testing, and one is in a careful clinical trial in India. This type of compound has a potential for contraceptive activity that has not received adequate attention in the past.

Pre-coital pill to alter the cervical mucus and prevent sperm penetration

25. Progesterone induces thickening of the cervical mucus so that during the normal cycle, a natural barrier to sperm penetration exists during the post-ovulatory phase. At least two compounds with oral activity as synthetic progestins have been tested for selective effect on the cervical mucus at doses that would not influence other progestin-responsive tissues. At first, it was believed that one of these compounds could cause thickening of the cervical mucus in the pre-ovulatory woman within two hours after taking a pill; but this proved to be an erratic response, not reliable for contraceptive purposes. Currently, no particular compound with the unique activity desired has been identified, but various trials with the conventional progestins taken before or near the time of coitus are proceeding.

Weekly pill to disrupt endometrial development

26. A synthetic progestin that can be taken weekly as an oral contraceptive is in the process of product development. It currently appears that the method will have a pregnancy rate similar to that of the "mini-pills" now available and will have a similar performance with respect to bleeding irregularities. Thus, the advantage, if any, will lie in the difference in schedule of administration.

Chemical abortifacient

27. The use of the naturally occurring prostaglandins or their synthetic analogues as first-trimester abortifacients has been studied extensively, but the disadvantages appear to outweigh the advantages. Further progress will depend upon the synthesis of new analogues which may be selectively more potent when acting on the myometrium than on other smooth muscle. Such studies will undoubtedly continue in the coming years, but the only immediate prospect for the application of the uterine-contracting activity of prostaglandins recently available in the United States is in place of the use of intra-amniotic saline or hysterotomy for mid-trimester termination of pregnancy, as a hospital procedure. No other chemical abortifacient is currently under overt investigation. It is believed that several of the cytotoxic agents used in cancer chemotherapy are either embryo-toxic or placento-toxic when given to women early in pregnancy. On this basis, methotrexate, available for treatment of choriocarcinoma, has earned a reputation as an effective chemical abortifacient but has not been subjected to controlled evaluation when used for this purpose. A careful evaluation of this compound or compounds with related activity could provide, within one or two years, an analysis of the risk/benefit ratio when used instead of surgical abortion.

Chemical or electro-cautery sterilization

28. Methods are now being tested, rather extensively, to cause closure of the tubal ostia by the trans-cervical approach. Instillation of an aqueous suspension of the chemical, quinacrine, is being studied by several groups. In addition, at least one sclerosing agent has been shown to be effective in a small series of cases. Particularly for situations in which hospital-bed space is limited, female sterilization as an out-patient procedure would result in greater use of this method for fertility limitation, although the irreversibility would still limit the appeal for young women of low parity. Also in an advanced stage of investigation is the use of trans-cervical cauterization of the tubal ostia with

the aid of hysteroscopic visualization. Indeed, this procedure is now sufficiently tested to be used by medical personnel with sufficient specialized training.

Immunization of women with an antigenic component of chorionic gonadotropin

29. Although considerable basic work is still required, there has been some preliminary, limited work involving volunteer subjects who have received purified human chorionic gonadotropin antigen as an innoculation designed to develop antibodies to the biologically active component or HCG. Ultimately, fragments of the molecule, readily synthesized, could be used in linkage with highly antigenic carrier molecules. Coordinate carriers would be those antigens widely used in public health immunization programmes. The purpose is to interfere with the essential early role of HCG as pregnancy attempts to become established, so that the expected menstruation will take place even in the event of a fertile cycle. A single innoculation presumably would last more or less indefinitely, but means of imparting reversibility to the procedure are feasible. For example, the effect of the immunization might be overcome by the use of exogenous progestins, in order to establish a pregnancy There are problems associated with cross-reaction with pituitary luteinizing hormone and the possibility of immuno-complex diseases that need to be resolved before unlimited clinical application would be possible.

30 The procedures described above are the 19 experimental contraceptive procedures—14 for use by women, five by men—which had had some level of actual clinical trial by early 1974. If there are others, the work has been either too preliminary to have been reported in the scientific literature, too incomplete to warrant discussion or kept confidential for commercial product-development reasons. There are, in fact, a few compounds in the latter category not covered in this review, but they do not hold special promise for dramatic breakthroughs in contraception

31. In any event, these 19 procedures are the major, if not only, prospects for new contraceptive methodology in the near future since they have already reached the stage of clinical investigation. Any potential method that has not yet had some degree of clinical trial is many years away from practical application, given the time needed to establish efficacy and safety.

32. The significance of the current items of applied contraceptive research is best put in perspective by realizing that those experimental methods which are most certain to succeed if development efforts continue are those most similar to existing methods and may, therefore, have least programmatical impact. Experimental methods that are most innovative and different, having the greatest likelihood of improving upon methods currently available, are less likely to survive the critical testing phases ahead. It would be foolhardy, indeed, to assume that the ultimate objectives in contraceptive research have now been identified and one need only to proceed with goal-oriented work to achieve them. The continuous identification of new leads is, perhaps, the critical part of the over-all process of developing new contraceptives. The development of a flow of new ideas to serve as the basis for clinical trial depends heavily upon studies fundamental to a greater understanding of the normal reproductive process.

Potential methods of the future

33 From the lines of clinical research now in progress, as well as other research topics which have not yet reached the stage of clinical trial, it is possible to compile a list of potential methods to regulate fertility which have a realistic basis in terms of our present knowledge. Scientific breakthroughs could at any time render such a list obsolete or incomplete. This limitation notwithstanding, the list serves to reveal the possibilities most likely to become the contraceptive methodology of the future.

Methods for use by women

34. The potential methods for use by women include.

(a) *Once-a-month pill.* This is a modification in the manner of using estrogen-progestin combinations. The steroids used are absorbed from the gastro-intestinal tract, stored in body fat and released gradually over a month. One preparation was tested, but was discontinued because of irregular bleeding and low level of effectiveness. Other compounds that work in this manner are possible,

(b) *Once-a-month injection.* This is a modification in the manner of using estrogen-progestin combinations. Long-acting steroid esters are injected at a dose calibrated to last one month;

(c) *Once-a-month vaginal ring* Preliminary trials have been completed. This procedure is based on anti-ovulatory action of a synthetic progestin released from a synthetic polymer and absorbed through the vaginal mucosa,

(d) *Long-term injection.* Extensively studied in clinical trial, this procedure is based on the anti-ovulatory action of a synthetic progestin without estrogen. Micro-crystallized suspensions of the steroid are injected in doses that will last three or six months;

(e) *Long-term implant.* Initial clinical studies are in progress; this procedure would provide chronic release of estrogen-progestin to suppress ovulation and menstruation;

(f) *Continuous low-dose progestin.* This method provides an anti-fertility effect without inhibiting ovulation or the normal endometrial cycle. The progestin can be given by various delivery systems:

(i) Pill or oil-filled capsule taken orally: commercial products are now available in many countries;

(ii) Subdermal implant: provides for continuous absorption from an elastomer at a constant rate. One

version now proved to work for one full year. Studies continuing to improve and simplify the method, and to prolong the life span of the implants. One category being tested lasts from one to four years; another type could last from seven to 10 years;

(iii) Removable vaginal ring: provides for continuous absorption, may act locally on cervical mucous glands or systemically to give the low-dose progestin anti-fertility effect;

(iv) Long-acting injection: requires the development of a preparation that would provide a depot effect that gives constant, low absorption below level that will affect pituitary or endometrium;

(v) Skin-contact absorption: requires the use of highly potent progestin, active at levels that could be absorbed through the skin—from a bracelet, for example, or by adding to a cosmetic or medication patch;

(vi) IUD-released: provides for continuous absorption and may act either locally in the uterus or systemically to give the low-dose progestin anti-fertility effect;

(g) *Long-term luteotropin injection.* This method requires a better understanding of the tropic control of the human *corpus luteum*. The purpose would be to lengthen the post-ovulatory phase of the cycle to perhaps 90 days so that a woman would have fewer ovulations per year, or to prolong post-partum amenorrhoea;

(h) *Monthly oral preparation to cause luteolysis.* Several compounds, active orally, have been claimed as having luteolytic activity in animals, and possibly in humans. Taken regularly, the drug would bring on menstruation regardless of whether the cycle had been fertile;

(i) *Monthly injection to cause luteolysis.* This would be an application of the proposed uterine luteolytic factor. If active in the human, it will probably require injection since preliminary work indicates a peptide structure. Objective would be as in method (h);

(j) *Vaginal tampon to cause luteolysis or uterine contraction.* This would be a method to apply substances, such as prostaglandins, that are not orally active. Used regularly, the method would bring menstruation regardless of whether the cycle had been fertile.

(k) *Non-regular use of methods* (*i*) or (*j*). A variation in the use of methods (*i*) or (*j*) would be to instruct the woman to do nothing for contraception, but on the infrequent occasion of a fertile cycle, as evidenced by a delay in menstruation, to use a luteolytic method;

(l) *Once-a-month anti-progestational pill.* This pill would be taken regularly at the time of the expected menses, to interfere with luteal maintenance of early decidua and to bring on endometrial sloughing regardless of whether the cycle had been fertile. Several compounds with a potential for this activity are available;

(m) *Pre-coital progestins.* At least one compound has been used which appears to cause a rapid change in the cervical mucus, making it impossible for sperm to penetrate;

(n) *Post-coital estrogen or anti-estrogen taken orally.* This procedure is effective in preventing pregnancy following isolated exposures. Presumably, it influences the rate of ovum transport, but it could have other sites of action. Several compounds are active in animals and believed to be active in women;

(o) *Post-coital anti-zygotic agent taken orally.* Work is required to seek compounds that would appear in the tubal fluid at adequate concentration to be toxic to the zygote without manifesting general toxicity;

(p) *Immunization with sperm antigens.* The objective is to prevent deposited spermatozoa from achieving fertilizing capacity in the female tract. Success has been reported in animals; but considerable basic work, including safety studies, is needed before human trials are feasible;

(q) *Injection of passively transferred antibodies to human chorionic gonadotropin (HCG).* This procedure would be employed on the occasion of a missed period, during the time that HCG stimulation of the *corpus luteum* is required to maintain a nascent implantation. Animal studies establish the feasibility of the approach;

(r) *Active immunization with HCG or portions of the molecule.* Recent advances in understanding the chemistry of HCG make it feasible to use this molecule, or a fraction of it, perhaps linked to a carrier antigen, for active immunization. An immunized woman could have a pregnancy subsequently, by use of exogenous progestins;

(s) *Improved methods to detect ovulation.* This is feasible on the basis of simplification in the method to detect estrogen, progesterone or luteinizing hormone in urine, saliva or blood (finger-prick sample). A variety of ovulation-prediction possibilities are available for exploration;

(t) *Reversible tubal occlusion.* Instead of sectioning the fallopian tube, a removable plug or clip would be introduced, either trans-cervically or through an abdominal approach;

(u) *Simplification of tubal ligation operation.* Currently being tested by several surgeons, the tube is sectioned or electro-coagulated by an endoscopic instrument;

(v) *Intra-uterine infusion of cytotoxins.* Intra-uterine infusion of cytotoxins has been reported as a means of inducing sterility. The safety and permanency of the procedure need further study. The objective is to occlude the intra-mural portion of the fallopian tube;

(w) *Sex determination at will by immunization with Y-sperm antigen.* There is evidence that specific antigens from Y-sperm may be identifiable. If so, women could be immunized against this antigen in order to inactivate Y-sperm and assure female sex determination. No similar approach to male sex determination can now be envisaged.

(x) *Sex determination at will by artificial insemination.* There have been occasional claims of success in separating X- and Y-spermatozoa in an ejaculate by physical means (centrifugation, electrophoresis, sizing, column diffusion). By using only Y-bearing gametes in artificial insemination, male zygotes could be assured. No confirmed procedure has yet been established. However, new techniques for identifying Y chromosomes may stimulate research in this field.

Methods for use by men

35. Potential methods for use by men are as follows:

(a) *Oral use of progestin plus subdermal implant of androgen to suppress spermatogenesis* Release of an androgen from a capsule of silicone rubber can be achieved in a low and constant rate for at least one year. This can provide a basis for maintaining levels of androgen therapy that may be medically acceptable, while suppressing spermatogenesis;

(b) *Periodic injection of long-acting androgen* Testosterone enanthate or other esters can suppress sperm production while providing androgen replacement therapy. Depot injections can remain active for from three to six months;

(c) *Oral tablet of synthetic spermatogenesis inhibitor.* Several compounds that act directly on the testis to prevent spermatocyte maturation have been reported In animals, some compounds require continuous administration, while others can be given for a few days each month. A non-toxic compound of this type is being sought,

(d) *Oral tablet to alter biochemical constitution of seminal fluid.* Although no specific compound has yet been identified that can influence fertility by this mechanism, the possibility of this type of action exists. The appearance of exogenously administered substances in seminal fluid has been reported;

(e) *Immunization with testis or sperm antigens.* This procedure can cause aspermatogenesis in animals. Purification of antigens, control over reversibility and mode of immunization remain as problems to be investigated for human application;

(f) *Reversible* vas deferens *occlusion.* The use of a liquid silicone rubber that vulcanizes into a pliable plug at body temperature has been attempted in animals. Plugs, clips and valves are being studied in men;

(g) *Reversible* vas deferens *ligation.* Procedures are being tested to modify the procedure for surgical vasoligation, in a manner that would improve prospects for reversibility;

Methods for use by either men or women

36. Potential methods for use by either men or women include:

(a) *Immunization with gonadotropin-releasing hormones* The isolation of these substances, simple polypeptides, may provide a basis for specific LH or FSH suppression so that gamete production in either the male or female could be prevented,

(b) *Immunization with enzymes specific for normal reproductive function.* There is evidence that specific iso-enzymes can be identified in gonadal or placental tissue. Although this work is at a preliminary stage of development, it could lead to a source of highly specific antigens;

(c) *Oral administration of chemical inhibitors of releasing hormone production.* Monamine oxidase inhibitors and other biological amines interfere with reproductive function in either male or female. These substances may act by interfering with the function of neuro-secretory cells in the central nervous system;

(d) *Immunization with purified gonadotropins* In either male or female animals, gonadotropin antibody formation leads to the expected result of gonadotropin deficiency. In some animals, LH immunization prevents the maintenance of early pregnancy;

(e) *Oral administration of anti-gonadotropic drugs.* Several anti-gonadotropic agents, either synthetic chemicals or natural plant products, have been reported. Taken regularly, an active and safe preparation of this type could prevent sperm production in the male or interfere with reproductive function in the female in a number of ways,

(f) *Topical application of pheromones* Laboratory experiments demonstrate that volatile agents produced by one animal can influence reproductive functions in another. The role of such substances in human reproductive physiology remains to be established.

Conclusion and overview

37. This extensive list of possible approaches to fertility regulation is based on current knowledge of the reproductive system Most of these methods, however, require considerable work at a fundamental level before practical application would be possible. It is known, for example, that chemical and perhaps physical differences exist between the sperm carrying and X chromosome (resulting in female offspring) and those with a Y chromosome (resulting in male offspring). Yet, the application of this knowledge for predetermination of sex, if desired, would require many years of fundamental research to establish both feasibility and safety. Similarly, it is clear that the critical event of ovulation is heralded by major hormonal changes that can be measured by sophisticated laboratory procedures The problem of how to convert this knowledge into a simple, practical method to assist women in predicting ovulation remains enigmatic. Elusive, also, have been the practical implications for fertility regulation of such fundamental discoveries as brain hormones which control egg maturation and release, the precise chemistry of gonad-stimulating hormone, the role of prostaglandins in the maintenance of ovarian function and the sequential process of sperm maturation culminating in capacitation The advent of new knowledge concerning the bi[illegible] of

reproduction has proceeded with phenomenal success during the past decade, but additional work of a fundamental nature is needed before these discoveries can be applied to the development of new methods of fertility regulation.

38. Meanwhile, applied contraceptive research, either for the improvement of existing methods or for the testing of entirely new possibilities, is proceeding at an unprecedented pace. Traditionally, product development in this field has been in the realm of the private sector. Now, there are several publicly supported programmes for the rapid development of new contraceptives. These programmes were developed because of the urgency of the need for simple, inexpensive, safe, effective and acceptable methods of fertility regulation throughout the world. They are designed with a view, primarily, towards the needs of low-income countries which cannot rely heavily on an advanced level of health services development.

39. Based on currently available knowledge, no fewer than 19 potential methods of contraception have reached some stage of clinical testing. This extent of activity in the testing of "new" or "modified" contraceptives is a welcome change from a few years ago when applied contraceptive research was chiefly the search for synthetic progestins that would compete favourably with the then-marketed birth-control pill, but would essentially duplicate the original method. From among the leads that are now known to be feasible and being tested, it is possible that before the end of the 1970s the contraceptive armamentarium will include an immunization method for women, a male pill supplemented by annual replacement of subdermal implants, annual subdermal implants for women, an optimal IUD, tri-monthly or semi-annual injections for women or men, a monthly pill to be taken at the end of each month to bring on a menses irrespective of whether the cycle has been fertile; and, ultimately, if even this list of choices does not result in "near-perfect" contraception, a safe and effective chemical abortifacient. Some of these methods, however, may ultimately be dropped for reasons of safety, lack of adequate effectiveness or insurmountable problems of product engineering. It is, however, possible to single out a few which have considerable promise and which, barring unforeseen difficulties, may emerge as important innovations in the next few years.

40. Subdermal implants of a medical-grade polymer which can release an anti-fertility hormone for prolonged periods of time have been tested since 1966. This appears now to be a method that can provide effective contraception for at least one year and, dependent upon the results of experiments already in progress, perhaps as long as four years. The disadvantages of the method are that the insertion of the implants under the skin is a clinical procedure requiring sterile techniques, and removal of the depleted capsules is required after the period of effectiveness. The major advantage is programmatical. A single clinic visit can initiate a long period of effective contraception without the need for sustained motivation. Depending upon the results of experiments currently in progress, it may be possible for the method to be initiated immediately (within hours) after delivery of a child and calibrated to last the period of time selected as the desired birth interval. This prospect depends upon the effect of the method on the quantity and quality of maternal milk production, issues that are being studied.

41. Intra-uterine devices also have the advantage of a single procedure providing a long period of contraception. Their main disadvantages thus for have been high discontinuation rates (for reasons of discomfort or irregular bleeding primarily), unsuitability as a method for women who have never had children and border-line effectiveness for widespread acceptance. To a large measure, these disadvantages may be overcome by experimental models of a copper-bearing IUD being studied. This device is one of several experimental IUDs being studied in an effort to overcome the difficulties with devices currently in use.

42. The requirement for daily pill-taking probably contributes in large measure to the failure experienced with hormonal contraceptives in actual use. A simple means of delivering a contraceptive dose of hormone, without a daily pill schedule, is in an advanced stage of testing and will probably be available in the near future. This means entails the use of a vaginal ring made of a synthetic polymer containing a supply of the anti-fertility drug, which is released gradually and absorbed by the vaginal tissue. Another advantage of this method is that estrogenic compounds are eliminated, thus reducing the level of medical anxiety concerning safety. Other approaches to offering an alternative to daily pill-taking as a basis for hormonal contraception are the tri-monthly injections of progestins, a procedure which is growing in acceptance in spite of unresolved safety issues, and a weekly pill which is being developed for commercial distribution in the near future.

43. Beyond these few methods which warrant consideration in current programme planning, other experimental approaches to contraception currently under clinical investigation are further away from introduction, even if the studies prove to be successful. Methods based on today's basic research are even more distant, yet their pursuit is vitally necessary. Like many of the remaining problems of biomedical discovery confronting modern science, the hopes for significant revolutionary breakthrough rather than incremental advances in contraception lie in the progress of basic research. The reproductive process remains one of the least understood physiological systems, in spite of the major discoveries of recent years. As new knowledge has emerged, new opportunities for goal-oriented applied research have become evident. Nevertheless, those points in the reproductive process which would appear most vulnerable to specific, controlled interference are still being probed by fundamental scientists for fuller understanding.

Part Nine

POPULATION POLICIES AND PROGRAMMES

POPULATION POLICIES AND PROGRAMMES

United Nations Secretariat *

BACKGROUND INFORMATION

1. The object of this paper is to present a summary of the world situation first with regard to population problems as perceived by Governments, and secondly with regard to policies formulated and implemented by them in order to resolve those perceived problems. The summary is intended principally for the use of delegations attending the World Population Conference Consequently, a flexible format is adopted in the presentation of the findings. Following this introduction, the most important conclusions are presented in a section on selected findings. More detailed information is presented in the second section Still further detail is presented in tables 1-24 in the annex.

2. The intention is to indicate how widespread is governmental concern with some of the most important problems associated with population. However, it is the intention neither to measure the intensity of governmental concern, nor to analyse the reasons for that concern and the extent of implementation of policies Information in both sections is presented separately for six groups of problems and policies: population growth; morbidity and mortality; reproduction and family formation; population distribution and internal migration; international migration; and demographic structure The order is that adopted in the draft World Population Plan of Action.

3. Notwithstanding the degree of generalization adopted for this purpose, preparatory work has been exhaustive Thus, after population problems were identified under the above mentioned six headings, an intensive search of recent official documentation available to the United Nations (see para. 6) was made to determine for each country the Government's position with regard to each problem and the policies, if any, that each has formulated in response to it. The problems chosen for inclusion were those: (*a*) which affect, on the basis of Governments' opinions, at least a substantial minority of countries or a substantial proportion of the world population; and (*b*) those for which Governments' perceptions and policies could be reliably determined for almost all countries At the current level of generalization, the findings may be treated with reasonable confidence as being a summary of the world situation in June 1974.

4. It is clear that the situation is subject to continuous change, in part as a result of the advent of further information, but largely as a result of fluctuations in the factors which influence problem perception and policy formulation, and modification of Governments' priorities with regard to population problems within the context of development. Therefore, it is intended to revise continuously the material presented in this paper.

5 All 148 States Members of the United Nations or of specialized agencies are included in this paper [1] Of these, 135 are States Members of the United Nations, and 13 are members of one or more of the specialized agencies only Their populations constitute 99 per cent of the estimated 1970 population of the world Hence, reference to the total population of these countries is equated in the paper with world population

Sources of information

6. Information has been obtained primarily from an exhaustive collection and analysis of the official statements of Governments Almost all have been published, or confirmed or transmitted to the Secretary-General of the United Nations within the past year A principal source of information has been the reply of Governments to a United Nations inquiry concerning population and development, and an associated request for country statements and summary statements for the World Population Conference [2] By the end of April 1974, 87 Governments had replied to one or more of these inquiries. Statements by Governments at regional population conferences,[3] at sessions of the Population Commission and the Economic Committee of the Economic and Social Council, and statements included in requests for assistance from the United Nations system have supplemented these primary sources. All replies

* Population Division of the Department of Economic and Social Affairs

[1] Grenada and the Democratic Republic of Viet-Nam are the only two sovereign States not included as they are neither members of a specialized agency nor of the United Nations.

[2] Reply to the second inquiry on population growth and development, 1972-1973, country statement prepared for the World Population Conference, 1974, and reply to the request by the Director of the United Nations Population Division for a summary statement of Governments' positions on population policy

[3] Country statements submitted to the African Population Conference, Accra, Ghana, 9-18 December 1971; the Second Asian Population Conference, Tokyo, Japan, 1-13 November 1972, and the First Regional Population Conference, Beirut, 18 February-1 March 1974

to United Nations inquiries on social progress[4] and the International Development Strategy,[5] all current development plans and analogous Government statements, all background documents prepared for the United Nations Development Programme (UNDP) country and intercountry programme proposals for the current period 1972-1976 and subsequently, and other Government statements have also been utilized. The only non-governmental sources used have been from several organizations with regard to national legislation on induced abortion and voluntary sterilization.[6]

7. The source of statistical information is the United Nations unless otherwise specified. Population projections are for the medium variant and are the most recent projections, prepared by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat in March 1974. In some tables percentages do not add to the total because of rounding.

Definitions[7]

8. The definition of more developed countries used in this paper is that currently in use by the Population Division for the purpose of preparing projections which have been used in this and other background papers, in order to maintain comparability between the policy and projection components of the documentation for the World Population Conference. Thus, more developed countries include all countries within the "more developed areas" defined for projection purposes.

9. Regional distributions in the tables are made on the basis of membership in United Nations regional economic commissions, modified slightly by geographical location. Table 1 (see annex) lists countries by regional economic commission area as defined in this study.

SELECTED FINDINGS

10. In this section, the most important of the findings of the study are presented. The reader interested in more detailed information may wish to consult the following section, "Commentary on tables", and the tables given in the annex.

11. Of the 148 countries included in the study, Governments of 21 countries perceive their rates of national population growth to be "deficient"; 42 countries perceive them to be "excessive" and 85 countries perceive them to be "acceptable" (table 2).[8] However, although less than 30 per cent of all countries perceive their population growth rates to be "excessive", these have a national population size that is much higher than average (table 3), and thus contain 57 per cent of world population and 81 per cent of the population of the less developed countries (table 2). Therefore, if population limitation policies in these countries are effective, they can have a considerable impact on the rate of world population growth and, more particularly, on the rate of population growth of the less developed countries. In fact, it has been estimated by the United Nations that if all countries which have formulated quantitative population growth targets (table 4) —whether these be to increase, decrease or maintain their rates of population growth—were to achieve their stated targets, the rate of growth of world population would be 1.7 per cent in 1985, instead of the United Nations projected rate of 1.9 per cent, and the rate of growth of the population of the less developed countries would be 2.0 per cent instead of the projected 2.3 per cent.

12. It should be noted that while all the countries that perceive their population growth rates to be "excessive" are less developed countries and have relatively high population growth rates, there are many other less developed countries that have high population growth rates but that consider those rates to be "acceptable" or even "deficient" (table 5). Furthermore, the proportions of less developed countries whose population growth rates are expected to increase in the coming few decades is actually lower in the "excessive" than in the "acceptable" or "deficient" categories, while the proportion of less developed countries whose rates of growth will remain unchanged or will decline is actually higher in the "excessive" than in the "acceptable" category (table 6). Thus, in general, concern with "excessive" trends does not coincide with high or rising rates of population growth; nor does a perception of "acceptable" or "deficient" trends coincide with moderate, low or declining rates of population growth.

13. Government policies directed towards affecting the fertility and international migration components of population growth do not necessarily correspond to Governments' perceptions of the acceptability of population growth rates (tables 7 and 9). First, while virtually all Governments that perceive national population growth rates to be "excessive" or "deficient" have formulated policies designed to influence one or both of these components of population growth, many of those which perceive national growth rates to be "acceptable" find them so because of the success of their policy intervention; thus, the "acceptable" category contains a number of countries that are actually implementing policies either to limit or to promote population growth and are, in this respect, similar to countries in the "excessive" and "deficient" categories, respectively. Furthermore, some countries undertake policies directed towards affecting fertility or international migration not for their effect on population

[4] Reply to the inquiry on the experience of States Members of the United Nations or members of the specialized agencies in achieving far-reaching social and economic changes for purposes of social progress, 1972-1973.

[5] Reply to the note verbale from the Secretary-General on the subject of the International Development Strategy, 1972-1973.

[6] See foot-note to table 16 in annex.

[7] Definitions of concepts used in the text and tables that follow are given in the appropriate parts of the following section.

[8] For exact definitions of these three perception categories, see paragraph 25.

owth, but to change these variables themselves evertheless, most countries that are attempting to mit" or "stimulate" fertility perceive their population owth rates to be "excessive" and "deficient" respec-ely. A similar degree of correspondence exists also th regard to countries that "encourage" emigration the one hand, and the perception of "excessive" pulation growth rates on the other. However, such rrespondence does not strongly exist with regard to untries that "discourage" emigration and "encour-e" immigration.

14. An attempt is made in table 8 to group the pulation policies indicated in table 7 in terms of their tential effect on population growth rates First, a o intervention" category is defined as consisting of countries that have no explicit policies to affect rtility rates, that "permit" emigration and that, as ost countries of the world, "restrict" immigration, at is, those which have undertaken no specific mea-res to relax immigration laws so as to permit signif-ant temporary or permanent immigration Countries at are undertaking one or more policies that tend to imit growth" or one or more policies that tend to romote growth" are classified under these two cate-ries, respectively; and countries that are undertaking licies that tend to do both (e.g, limit fertility and courage immigration) are classified under a "contra-ctory" category. On the basis of this classification, is found that 71 countries have policies with regard fertility and international migration components of pulation growth that tend to promote population owth, 47 have policies that tend to limit population owth, 1 has "contradictory" policies and 29 are in e "no intervention" category (table 8). However, hile 48 per cent of the countries have policies that ould promote population growth and only 32 per cent ave policies that would limit it, only 33 per cent of orld population live in the former countries, while 7 per cent live in the latter. In fact, 79 per cent of e population of the less developed countries is in the

[illegible]

ote population growth is in the regions of the United ations Economic Commissions for Europe (ECE) and r Western Asia (ECWA), while the highest propor-ons undertaking policies that would limit population owth are in the region of the Economic Commission r Asia and the Far East (ECAFE).

15 Governments of all countries wish to increase e life expectancy at birth of their citizens as an inte-

[illegible]

xtremely low, even for less developed countries. evertheless, 50 countries, of which 34 are in Africa nd 11 in Asia and the Far East, have expectation of fe below 50 years (tables 10 and 11). It appears clear, erefore, why the Governments of many less devel-oped countries, particularly in Africa, consider the rapid reduction of mortality levels to be one of the highest priority areas in their population and devel-opmental policies.

16. Fifty-nine per cent of countries perceive their current rates or trends of national fertility to be "accept-able" and are, therefore, not intervening to change them; 28 per cent perceive them to be "excessive" and are explicitly intervening to limit them and 12 per cent perceive them to be "deficient" and are explicitly inter-vening to stimulate them (table 12) However, while only 28 per cent of countries are attempting to limit fertility, those countries contain 57 per cent of world population and 80 per cent of the population of the less developed countries. On the other hand, 78 per cent of the population of the more developed countries live where fertility rates are perceived by Governments to be "acceptable", and another 20 per cent where Governments perceive fertility rates to be "deficient". It is interesting to note that, among the five regions, the ECWA region has the largest proportion (92 per cent) of countries in the "acceptable" category, the ECAFE region has the largest proportion (62 per cent) in the "excessive" category and the ECE region has the highest proportion (26 per cent) in the "deficient" category. It is interesting also that there is little corre-spondence between the actual levels of fertility and Governments' perception of their acceptability. The average crude birth rate for the less developed coun-tries is virtually the same in all perception categories; for the more developed countries, it is, in fact, slightly higher in the "deficient" than in the "excessive" cate-gory (table 13).

17. Four categories of Governments' attitudes to-wards the use of contraception and family planning services are identified. situations in which Governments "restrict", "accept", "support" or "sponsor" family planning services. These four categories reflect, in general terms, progressively higher degrees of involve-ment of Governments in the provision of family plan-ning services.[9]

18. The most significant finding with regard to family planning is the fact that only in eight countries, containing 2 per cent of the world population, do Governments actively enforce laws designed to "restrict" in some way the production or distribution of contra-ceptives In all other countries, Governments at least "accept" individual practice of contraception and the activities of either family planning organizations or local authorities On the other hand, in 50 per cent of countries, containing 81 per cent of the world popu-lation, Governments themselves "sponsor" family plan-ning services generally as an integral part of their public health services (table 14). It would appear, therefore, that governmental objection to family plan-ning activities is limited and that a major function of international agencies in this field is to assist countries,

[9] For a definition of these four categories, see para ph 52

ıpon request, to strengthen their family planning services and to make the provision of these services nore effective.

19. There appears to be only partial coincidence of Governments' perception of the acceptability of its fertility rates, on the one hand, and its degree of involvement in the provision of family planning services, on the other. As might be expected, 88 per cent of the Governments that perceive fertility rates in their countries to be "excessive" do, in fact, "sponsor" family planning services. However, it is notable that 50 per cent of those which perceive fertility rates to be "deficient" also "sponsor" family planning services. Furthermore, while all countries in the "excessive" perception category at least "accept" the family planning activities of either private organizations or local authorities, a large majority also does so in the other perception categories: 78 per cent among the "deficient" fertility category and 95 per cent in the "acceptable" fertility category (table 15). Consequently, it appears that while family planning services may be used as a means to reduce fertility, most Governments "accept", "support" or "sponsor" the provision of these services irrespective of their goals with regard to modification of fertility rates. Thus, the world situation appears, in general, not to contradict the proposition that the aim of family planning is to ensure that couples shall be able to exercise effectively their human right to determine freely and responsibly the number and spacing of their children.

20. As mentioned earlier, the four categories of Governments' attitudes towards the provision of family planning services may be considered roughly to reflect progressively higher degrees of governmental involvement. These four categories, therefore, may be assigned the numbers 0, 1, 2 and 3, respectively. The average number for a group of countries, which can vary from 0 to 3.0, may then roughly reflect the degree of involvement of the Governments of this group in the provision of family planning services. On the basis of this index, the average degree of involvement for the world as a whole is relatively high (2.1), that is, slightly greater than that for the "support" category. While there is little difference in the value of the index between more developed and less developed countries, there are significant variations among the different regions: the lowest degree of involvement (1.6) occurs in the African and Western Asian regions; and the highest (2.7) in the region of Asia and the Far East, where most Governments "sponsor" family planning activities. The value in the European and Latin American regions is close to the world average. It is interesting to note that two areas in which the degree of governmental involvement in family planning activities is highest are the region of Asia and the Far East and the subregion of Eastern Europe: the first area contains the highest proportion of countries attempting to limit fertility and the second the highest proportion of countries attempting to stimulate fertility.

21. About one half of Governments perceived the rate of population growth in metropolitan regions to be "excessive" and little variation exists in this respect between less developed and more developed countries or among the various regions of the world. Furthermore, the proportion of countries that perceive these rates to be "excessive" does not appear to increase significantly when the rates themselves increase. In other words, as in the case with perceptions of national population growth rates, high rates do not, in the perception of Governments, necessarily correspond to "excessive" rates (tables 17 and 18).

22. The information collected on population distribution and internal migration policies indicates that a large majority of Governments perceive the urbanization process in their countries to be a positive manifestation of development and modernization. Although very few Governments have policies to encourage internal migration into their metropolitan regions, 58 per cent have policies to divert internal migration flows away from metropolitan regions but into the urban centres of non-metropolitan regions. Only a very small number of Governments have explicit policies to discourage internal migration into all urban areas (table 19).[10]

23. The extent to which concern over a given population problem is widespread may be measured by the number of Governments expressing concern over that particular problem. On the basis of such a measurement, it is clear from a comparison of the data in tables 2 and 17 that concern over "excessive" population growth in metropolitan regions, which was expressed by 67 countries, is much more widespread than concern over "excessive" national population growth, which was expressed by only 42 countries. This is true for both more developed and less developed countries, though certainly to a lesser extent in the latter. It is also true for all regions except that of Asia and the Far East, in which concern over "excessive" population growth is more widespread. For the region of the United Nations Economic Commission for Europe, governmental concern over "deficient" rather than "excessive" population growth follows the concern over metropolitan growth.

24. Information collected with regard to governmental policies dealing with international migration suggests clearly that Governments are extremely concerned with this component of population growth, not only in terms of purely administrative control of movements into and out of their countries, but in relation to over-all size, growth and composition of their population and labour force. Fifty-two per cent of the countries "permit" or "encourage" permanent emigration and 66 per cent "permit" or "encourage" temporary emigration (tables 21 and 22).[11] On the other

[10] For definitions of internal migration policies, see paragraphs 62 and 63.

[11] For definitions of international migration policies, see paragraphs 77 and 81.

hand, 22 per cent of the countries "encourage" permanent immigration and 24 per cent "encourage" temporary immigration (tables 23 and 24). As might be expected, the large majority of countries that "encourage" immigration are in ECE and ECWA regions.

COMMENTARY ON TABLES

Population growth

Definitions of categories of Governments' perceptions of population trends

25. Three categories of Governments' perception of the acceptability of current levels or trends in rates of national population growth were identified.

(a) *Rates "excessive"*: in this category are included all countries whose Governments have indicated that current or expected rates of population growth were too high, thus necessitating appropriate policy intervention to limit them All Governments in this category have actually formulated policies to limit fertility, to encourage net emigration, or both;

(b) *Rates "deficient"*. in this category are included all countries whose Governments have indicated that current or expected rates of population growth were too low, thus necessitating appropriate policy action to promote them. All Governments in this category have actually formulated policies either to stimulate fertility or to encourage net immigration, or both;

(c) *Rates "acceptable"*: in this category are included all countries whose Governments have indicated that current or expected rates of population growth are satisfactory, thus necessitating no further policy intervention. Some two thirds of these countries have no population growth policies. Some one third, however, find population growth rates satisfactory only as a result of their policy intervention. Still others may be undertaking fertility and international migration policies for purposes other than affecting population growth rates.

Governments' perception of the acceptability of current levels or trends of national population growth rates (table 2)

26. The Governments of 85 of the 148 countries included in this study perceive their national population growth rates to be "acceptable". In 1970, their populations constituted 37 per cent of the total. The Governments of 42 countries, containing 57 per cent of total population, perceive national population growth rates to be "excessive"; and the Governments of 21 countries, containing 7 per cent of total population, perceive rates to be "deficient".

27 Governments' perceptions of the acceptability of national population growth rates differ between more developed and less developed countries. For example:

(*a*) A higher proportion of Governments, and an even higher proportion of the populations, of more developed countries than of less developed countries perceives rates of population growth to be "acceptable";

(*b*) By far the largest proportion of more developed countries is in the "acceptable" category, and none is in the "excessive" category; in contrast, the smallest proportion of less developed countries is in the "deficient" category, the remainder being more equally distributed between the "acceptable" and the "excessive" categories,

(*c*) One of the greatest differences between more developed countries and less developed countries is that of the proportion of their populations in the "excessive" and "deficient" categories: none of the total population of more developed countries is resident in countries whose Governments perceive population growth rates to be "excessive", compared with 81 per cent of the total in the case of less developed countries: conversely, only 3 per cent of the population of less developed countries is resident in countries whose Governments perceive population growth rates to be "deficient", compared with 18 per cent of the total in more developed countries.

28. The proportion of countries in each of the three categories of Governments' perception of trends in rates of population growth differs considerably between regional economic commission areas. For example.

(*a*) The ECAFE region is the only one in which a majority of countries (62 per cent) is in the "excessive" growth category. The ECAFE region also has the lowest proportion of countries in the "acceptable" and the lowest but one in the "deficient" categories;

(*b*) The highest proportion in the "acceptable" category are found in the ECE and ECWA regions.

Governments' perception of the acceptability of current levels or trends of national population growth rates, by size of estimated 1970 population (table 3)

29 The average size of countries whose Governments perceive population growth to be "excessive" is substantially higher than those in the "acceptable" and "deficient" categories

30 Although the 42 countries whose Governments perceive population growth rates to be "excessive" have sizes of total population which range from very small to very large, half have total populations of 10 million and over, and six have populations of over 50 million. In contrast, although only 24 per cent of those countries which perceive population growth rates to be "acceptable" have total populations over 10 million, 43 per cent of countries which perceive population growth rates to be "deficient" have populations of this size.

31. Of the countries that perceive population growth rates to be "deficient", 57 per cent have populations under 10 million. This proportion may be compared with 50 per cent for those countries which perceive rates to be "excessive" and 76 per cent for those countries which perceive rates to be "acceptable". Thus, although there is some tendency for countries with large total populations to perceive growth rates

to be "excessive", population size is clearly only one of several factors in the formulation by Governments of their perception of trends in population growth rates.

Governments' perception of the acceptability of current levels or trends of national population growth rates, by state of specification of quantitative population growth targets (table 4)

32. Twenty-five countries have quantitative targets to reduce population growth rates and six have targets to increase them. All countries in the former category are less developed and all except one of the countries in the latter category are more developed.

33. Although only 25 of the 42 less developed countries whose Governments perceive population growth rates to be "excessive" have set quantitative targets, these contain 92 per cent of the population in this perception category, 75 per cent of the population of less developed countries and 52 per cent of world population. On the other hand, the six countries in the "deficient" category which have set quantitative targets contain less than 2 per cent of world population. Furthermore, countries whose objective is to reduce their rates of population growth wish to reduce them significantly, while those whose objective is to increase their growth generally wish to do so only to a small extent. Consequently, it is estimated that if all countries that have population growth objectives—whether to increase, decrease or maintain current rates—achieve their targets, then the population growth rate in 1985 would be about 2 per cent for developing countries, compared with the projected 2.3 per cent for that year, and about 1.7 per cent for the world compared with the projected 1.9 per cent.

Governments' perception of the acceptability of current levels or trends of national population growth rates by estimated average annual growth rate, 1970-1975 (table 5)

34. The average of annual population growth rates during the period 1970-1975 showed little variation between perception categories, in both more developed countries and less developed countries. However, this relationship is qualified by the distribution by growth rate of countries within perception categories. Thus:

(*a*) Although all but one of the 42 countries in the "excessive" category do have population growth rates of over 1.5 per cent per annum and the majority of them have rates over 2.5 per cent, there are 55 countries in the "acceptable" category with rates of over 1.5 per cent, and there are nine countries in the "deficient" category with rates as high;

(*b*) Conversely, although 12 of the countries that have population growth rates under 1.5 per cent are in the "deficient" category, 30 are in the "acceptable" and one is in the "excessive" category. Therefore, "deficient" rates are not synonymous with low rates, nor "acceptable" with moderate, nor "excessive" with high rates.

Governments' perception of the acceptability of current levels or trends of national population growth rates, by projected trend in growth rates, 1970-1985 (table 6)

35. There is little relationship between Governments' perception of rates of national population growth, and projected future rates. Thus:

(*a*) Forty-four countries will have higher average growth rates in 1980-1985 than in 1970-1975; of these countries, 15 perceive these trends to be "excessive"; but 22 perceive trends to be acceptable, and 7 perceive them to be "deficient";[12]

(*b*) Fifteen countries will have lower growth rates in 1980-1985 than in 1970-1975; of these, 2 perceive trends to be "deficient", 7 perceive trends to be "acceptable" and 6 perceive them to be "excessive".[13]

36. Thus, trends that will result in higher growth rates are not considered by Governments to be synonymous with "excessive", trends that will result in lower growth rates are not synonymous with "deficient" and trends that will result in similar future rates are not synonymous with "acceptable" trends.

Governments' perception of the acceptability of current levels or trends of national population growth rates, by policies with regard to fertility and international migration which have a potential effect upon national population growth rates (table 7)[14]

37. Practically all countries that perceive their population growth rates to be "acceptable" do not have policies explicitly directed towards affecting fertility; practically all countries that perceive their rates of population growth to be "excessive" have policies explicitly designed to limit fertility; and the large majority of countries that perceive their population growth rates to be "deficient" have policies to stimulate fertility. No such close correspondence exists, however, between population growth perception categories and policies dealing with international migration. For example, many Governments that perceive their rates of population growth to be "acceptable" undertake international migration policies that tend to affect population growth rates positively or negatively. Nevertheless, of the 42 countries that perceive their rates of population growth to be "excessive", only 1 "encourages" immigration and only 1 "discourages" emigration. On the other hand, of the 21 countries that perceive their population growth rates to be "deficient", about one half "encourage" immigration and all but one "discourage" emigration.

[12] Average rate in 1980-1985 at least 0.3 percentage points higher than average rate in 1970-1975.

[13] Average rate in 1980-1985 at least 0.3 percentage points lower than average rate in 1970-1975.

[14] For exact definition of the policy categories used in table 7, see sections given below on reproduction and family formation and international migration.

Potential effect of governmental policies with regard to fertility and international migration upon national population growth rates (table 8)

Definitions of potential effect

38. Four groupings of policies directed towards affecting fertility and international migration are determined on the basis of their potential effect on population growth rates. First, there is a "no intervention" category that includes all countries that have no policies explicitly directed towards affecting fertility rates, that "permit" emigration and that "restrict" immigration in the sense that they have not relaxed immigration laws so as to encourage significant numbers to immigrate temporarily or permanently. A second category to "limit growth rates" contains all countries that "limit fertility", "permit" or "encourage" emigration and "restrict" immigration. A third category to "promote growth rates" consists of all countries that "stimulate" fertility, "permit" or "discourage" emigration and "restrict" or "encourage" immigration The fourth category is "contradictory", where the potential effects of fertility and international migration policies on population growth are contradictory (e g , "limit" fertility and "encourage" immigration).

39. On the basis of the foregoing classification, it is found that 20 per cent of the countries have no [illegible]

population growth and less than 1 per cent have policies that are "contradictory".

40. While only 32 per cent of all countries have fertility and international migration policies that tend to "limit" population growth rates, those countries contain 57 per cent of world population and 79 per cent of the population of the less developed countries. On the other hand, while 48 per cent of countries have fertility and international migration policies that tend to "promote" population growth rates, those countries contain only 33 per cent of world population and 14 per cent of the population of less developed countries. Some 76 per cent of the population of the more developed countries live in countries that have fertility and international migration policies which tend to "promote" population growth rates and an additional 17 per cent live in countries in the "no intervention" category.

Potential effect of government policies with regard to fertility and international migration upon national population growth rates by Governments' perception of the acceptability of current levels or trends of national population growth rates (table 9)

41. A certain degree of correspondence exists between Governments' perception of the acceptability of population growth rates and the potential effect of their fertility and international migration policies on growth rates Thus, virtually all countries in the "no intervention" category perceive their rates of population growth to be "acceptable" and 39 of the 44 countries that are undertaking fertility and international migration policies that tend to limit population growth rates perceive these rates to be "excessive". However, 50 of the 61 countries that are undertaking fertility and international migration policies that tend to promote population growth rates perceive these rates to be "acceptable" (the remainder, as expected, perceive them to be "deficient").

Morbidity and mortality

Estimated average life expectancy at birth, 1970-1975, and Governments' perception of the acceptability of current levels or trends of national population growth rates (tables 10 and 11)

42. As might be expected, all Governments have formulated policies designed to reduce morbidity and mortality, and none has considered acceptable a policy of permitting survival rates to remain low in order to prevent further increases in rates of national population growth A national average life expectancy at birth of less than 50 is used in this paper as an indicator that mortality remains excessively high. It is clear that, particularly in the region of the United Nations Economic Commission for Africa (ECA), but also in the ECAFE and ECWA regions, with 79, 38 and 25 per cent of constituent countries, respectively, having estimated average life expectancy below 50, high mortality remains a predominant population problem. In the region of the Economic Commission for Latin America (ECLA), only two countries have the same degree of mortality problem, and no country in the ECE has so severe a problem.

43. Those less developed countries which perceive their population growth rates to be "excessive" may have experienced greater declines in mortality than other less developed countries. This is indicated by the slightly higher average life expectancy of those less developed countries whose Governments perceive "excessive" rates (54 years) as compared with that of the less developed countries whose Governments perceive rates to be "acceptable" (49 years), and those which perceive rates to be "deficient" (48 years).

Reproduction and family formation

Definitions of categories of Governments' perceptions of fertility

44. Three categories of governmental perception of current and prospective fertility rates may be identified: rates "acceptable"; rates "excessive"; and rates "deficient". These three categories are similar to those used [illegible]

fying fertility rates, and virtually all countries in the other two categories have formulated explicit policies, these three perception categories correspond almost completely to three intervention categories of "inter-

vention undesirable", "intervention desirable to limit fertility" and "intervention desirable to stimulate fertility". Reference in the tables, therefore, is to combinations of these two corresponding sets of categories, namely, "rates acceptable, intervention undesirable", "rates excessive, intervention desirable to limit fertility" and "rates deficient, intervention desirable to stimulate fertility". For the sake of brevity, however, these three categories are referred to in the text as "acceptable", "excessive" and "deficient", respectively.

Governments' perception of the acceptability of current levels or trends of average national fertility rates and perception of the desirability of intervention to modify fertility rates (table 12)

45. The Governments of 88 of the 148 countries included in this study consider national fertility rates to be "acceptable". In 1970, their populations constituted 35 per cent of the total.

46. The Governments of 60 countries consider national fertility rates unacceptable and consider policy intervention to modify them to be necessary. In 1970, their populations constituted 65 per cent of the total. Two groups may be defined: (*a*) 42 countries, in which fertility rates are considered by Governments to be "excessive", and which contain 57 per cent of total population; (*b*) 18 countries in which fertility rates are considered "deficient" and which contain 8 per cent of total population.

47. Governments' perceptions of the acceptability of fertility rates differ between more developed and less developed countries. For example:

(*a*) While only one of the more developed countries considers fertility rates "excessive", 39 per cent of the less developed countries, containing 80 per cent of the total population of these countries, are in this category;

(*b*) While 26 per cent of the more developed countries, containing 20 per cent of their total population, consider their fertility rates "deficient", only 7 per cent of the less developed countries, containing only 1 per cent of their total population, are in this category;

(*c*) While 78 per cent of the total population of more developed countries are in countries whose Governments consider fertility rates to be "acceptable", 81 per cent of the total population of less developed countries are in countries whose Governments consider fertility rates unacceptable.

48. The proportion of constituent countries that have each of these three perceptions differs considerably among regional economic commission regions. For example:

(*a*) Only one country in the ECWA region and two in the ECE region consider their fertility "excessive", whereas 62 per cent of those in the ECAFE region do so;

(*b*) Of the countries that consider fertility rates "excessive", 43 per cent are in the ECAFE region and 33 per cent in the ECA region;

(*c*) At least two thirds of countries in all except the ECA and ECAFE regions consider fertility rates to be "acceptable": in the ECA region, only slightly more than half, and in the ECAFE region, only 31 per cent do so.

Governments' perception of the acceptability of current levels or trends of average national fertility rates and perception of the desirability of intervention to modify fertility rates, by estimated crude birth rates, 1970-1975 (table 13)

49. There is very little relationship between actual fertility, as measured by crude birth rates, and Governments' perception of fertility. The average crude birth rate is 12 for more developed countries that perceive fertility to be "acceptable", 17 for more developed countries that perceive it to be "deficient", and 15 for more developed countries that perceive it to be "excessive". For less developed countries, there is very little difference in the average crude birth rate for each of the three perception categories.

50. Of the 75 countries with crude birth rates of 40 and above, over half consider the trend to be "acceptable" rather than "excessive", while of the 35 with crude birth rates of less than 20, almost three quarters consider these to be "acceptable" rather than "deficient".

51. There are countries with crude birth rates of between 30 and 49 which perceive fertility rates to be "deficient": conversely, there are countries with crude birth rates of less than 30 which perceive these rates to be "excessive".

Governments' policies with regard to their involvement in the provision of family planning services (table 14)

52. Four categories of Governments' attitudes towards contraceptive use and family planning services are identified:

(*a*) Governments that "restrict" use by actively enforcing some restrictive laws or measures concerning the production or distribution of contraceptives;

(*b*) Governments that "accept" or rely upon the provision of family planning services by private organizations or local authorities, but that do not actively support such activities;

(*c*) Governments that actively "support" the programmes of private organizations and local authority activities or both, or that have implemented pilot programmes in government departments;

(*d*) Governments that themselves "sponsor" family planning activities as part of public health services.

53. The principal characteristics of the situation are as follows:

(*a*) In 50 per cent of the countries, containing 81 per cent of world population, the provision of information and materials required for the practice of modern methods of contraception is already an integral

part of national public services, particularly health services;

(b) In an additional 16 countries, with 6 per cent of world population, Governments directly support the activities of private organizations and local authorities in the provision of information and materials;

(c) In 50 countries, containing 11 per cent of world population, Governments accept or rely upon the provision of family planning services by private organizations or local authorities, but do not actively support such activities;

(d) In only eight countries, containing only 2 per cent of the world population, Governments enforce laws restricting aspects of the production or distribution of contraceptives.

Governments' policies with regard to their involvement in the provision of family planning services by perception of the acceptability of current levels or trends of average national fertility rates and by perception of the desirability of intervention to modify fertility rates (table 15)

54. It appears necessary to separate Governments' perception of the desirability of modifying national fertility rates from their attitude to the use of modern contraception by their populations, and the provision to them of family planning services. While 88 per cent of the Governments that consider fertility rates to be "excessive" directly "sponsor" family planning services, half of those which consider fertility rates "deficient" also directly "sponsor" family planning services, as do 32 per cent of those countries which consider fertility rates to be "acceptable".

55. Of the less developed countries whose Governments perceive fertility rates to be "excessive", 92 per cent "sponsor" or "support" family planning services However, only a third of the less developed countries that perceive rates to be "acceptable", and only four of the seven less developed countries which perceive rates to be "deficient" either "sponsor" or "support" these services.

56. Two thirds of the less developed countries that perceive fertility rates to be "acceptable" give no direct support to local authority or private activities. A high proportion of these countries consider government involvement premature in view of the relatively limited diffusion of modern attitudes to fertility. However, in many of them, interest is growing in inclusion of family planning services within public health services for purposes of maternal and child health, and family welfare.

Governments' policies with regard to induced abortion and voluntary sterilization by perception of the acceptability of current levels or trends of average national fertility rates and perception of the desirability of intervention to modify fertility rates (table 16)

57. Induced abortion on the basis of medico-social and social indications, or upon request, is legal for females without restriction as to the number of their children in 35 countries, 24 per cent of the total. However, in only seven countries, all but one in the ECAFE region, is induced abortion explicitly considered a means of fertility reduction. In five countries in the ECE region, whose Governments perceive fertility to be "deficient", the basis for permitting induced abortion to occur has been, within recent years, restricted significantly However, medico-social and social indications remain admissible. In these and in 23 other countries, the explicit objective is the protection of maternal and child health, family welfare and the status of women, and thereby the avoidance of such problems as a high incidence of unwanted or abandoned children and high rates of maternal and infant mortality.

58. Voluntary sterilization is clearly legal in 24 countries, in 15 of which induced abortion on the basis of medico-social and social indications or upon request is also legal In 10 countries that perceive fertility rates to be "excessive", an important, if not primary, objective of legalizing voluntary sterilization is to contribute to fertility reduction In the other countries, the objectives are stated to be those of human welfare In 116 countries, the legal situation is not clear; in only 8 countries is sterilization clearly illegal

Governments' policies with regard to sterility and sub-fecundity

59 Information concerning Governments' perception of the problem of sterility and sub-fecundity is currently inadequate. Only five countries, all in the ECA region, have explicitly raised this problem in the framework of their population goals and policies In these countries, a high incidence of sterility and sub-fecundity constitutes the primary reason for the perception by Governments that both fertility and population growth rates are "deficient" In two of these countries, the problem is severe in almost all regions, in the other three in some, but not all, regions It is possible that proportions may be quite significant in other less developed countries, for which adequate data are not yet available

60 In one of these five countries, a policy of substantial increase in attention to these problems within public health services has been implemented; and in a second, research into the problem is in progress. Family planning is perceived as one method of contributing to improved maternal health and family welfare, and hence to reduction of sterility and sub-fecundity.

Governments' position with regard to provision of social benefits with the objective of influencing fertility rates

61. Only 14 countries have explicitly stated that the benefits made available through their social security systems are in part at least designed to achieve a modification of fertility rates. All but three of these countries perceive current fertility rates to be "defi-

cient", and hope to bring about moderate increases as a result of subsidizing the costs of marriage, childbirth and child-rearing. In the remaining three countries, social benefits that discriminate against families with children above a specified number have been implemented to contribute to a reduction in fertility rates. All three countries perceive fertility rates to be "excessive" and have integrated family planning in national health services.

Population distribution and internal migration

Definitions of categories of Governments' perceptions of population growth in metropolitan regions

62. For the purposes of this paper, each country has been divided into the following functional regions: metropolitan; non-metropolitan; and unoccupied regions. Metropolitan regions have been defined for most countries as consisting of: (*a*) the urban centre which occupies a position of first order within the national urban system; and (*b*) its immediate (third-order) functional region. For a few countries, more than one such metropolitan region have been defined, either where several larger centres have experienced autonomous development because of very large distances separating principal urban centres, or because of incomplete integration into a unified national urban system of two or more historically separate territories and their respective urban systems. Not all countries have unoccupied regions. A few countries comprise only a metropolitan region. This is the case for four less developed countries and five more developed countries whose territorial size is so small (less than 1,000 km^2) that the whole national territory is either within the immediate field of influence of the largest, "metropolitan", centre or is entirely occupied by the centre's built-up area. The urban populations in both metropolitan and non-metropolitan regions have been defined as that resident within urban centres which rank in the third and higher order within the national urban system.

63. Three categories of government perception of the acceptability of levels or trends of population growth rates in metropolitan regions are used: rates "acceptable"; rates "excessive"; and rates "deficient". These three categories are defined in a similar manner to the corresponding categories of acceptability of national population growth (para. 25). The policies of Governments are indicated separately in the tables.

Governments' perception of the acceptability of current levels or trends of metropolitan region population growth rates (table 17)

64. No Government perceives rates of population growth in the metropolitan regions to be deficient. Almost half of all countries, and slightly more than half of the countries included in table 17, perceive metropolitan growth to be "excessive". This proportion does not differ significantly between more developed and less developed countries, nor among the regional economic commission areas.

65. The proportion of the total population that is located in countries in the "excessive" category is 68 per cent. However, a major difference exists in this regard between more developed and less developed countries: only 34 per cent of the population of more developed countries lives in countries in the "excessive" category while 83 per cent of the population of less developed countries lives in countries in this category.

Governments' perception of the acceptability of current levels or trends of metropolitan region population growth rates by perception of acceptability of current levels or trends of national population growth rates and by urbanization characteristics (table 18)

66. There is only limited coincidence of Governments' perceptions of the acceptability of present levels or trends of metropolitan and national population growth rates: only 24 countries, all less developed countries, perceive both to be "excessive". Conversely, of the 72 countries included in table 18 which perceive national growth to be "acceptable", 31 perceive metropolitan growth to be "excessive", and of the 19 countries which perceive national growth to be "deficient", 12 perceive metropolitan growth to be "excessive" (9 countries for which information is insufficient, and 7 countries, whose entire territory is within their "metropolitan region", are excluded from this analysis).

67. For less developed countries, the proportion of countries which perceive metropolitan growth to be "excessive" increases as the proportion of the national population defined as urban increases: from 44 per cent for the 0-19 per cent urban category, to 53, 55 and 66 per cent for the three higher categories. No similar relationship occurs for more developed countries.

68. Although rates of urban population growth are not available for 34 countries, and although rates of metropolitan region growth are not necessarily the same as urban population growth rates, nevertheless it is noteworthy that, at least for the limited number of countries included, the proportion of both less developed countries and more developed countries which consider metropolitan region population growth to be "excessive" increases as the estimated rate of urban population growth increases, but this cannot *a priori* be considered statistically significant.

69. A higher proportion of countries in which a primate urban system exists (that is, for the purposes of this paper, where the metropolitan urban centre is more than 2.5 times the size of the second largest centre) perceive metropolitan growth to be "excessive": for less developed countries, 54 per cent compared with only 38 per cent for countries with a non-primate system, and for more developed countries 75 per cent compared with 21 per cent.

Governments' policies with regard to redistribution of national population by Governments' perception of the acceptability of current levels or trends of

metropolitan region population growth rates and by urbanization characteristics (table 19)

70. No detailed presentation of all aspects of Governments' policies with regard to population distribution and internal migration is attempted in this study, although the summary information is based upon detailed studies in progress

71. The principal findings of this review of internal distribution policies are summarized as follows:

(*a*) Forty-seven countries, 36 per cent of the total, do not seek to divert internal migration from metropolitan regions;

(*b*) Seventy-six countries, 58 per cent of the total, permit migration from rural areas and small urban centres, but seek to divert this movement from metropolitan regions, either into a relatively small number of large secondary urban centres (in the case of 14 countries), or into a system of urban centres of varied size and function outside the metropolitan region (in the case of 62 countries),

(*c*) Only nine countries, 8 per cent of the total, seek to discourage migration from rural areas and small urban centres completely;

(*d*) The proportion of countries whose Governments do not seek to divert migration away from metropolitan regions is considerably higher: (i) in less developed countries than in more developed countries; (ii) in countries where metropolitan region growth is perceived to be "acceptable" than in those where it is perceived to be "excessive"; and (iii) where a metropolitan primate condition exists, rather than where a non-primate condition exists. It is highest for countries in which the urban proportion is still under 40 per cent;

(*e*) The proportion of countries whose Governments seek to divert migration from metropolitan regions into the urban system in the remainder of the country is considerably higher for more developed countries than for less developed countries, for countries which perceive metropolitan growth to be "excessive" than in those which consider it to be "acceptable", and for countries with a non-primate situation than for those with a primate situation The proportion increases regularly as the urban proportion in the total population increases;

(*f*) Some countries that perceive metropolitan growth to be "excessive" have, nevertheless, not formulated policies designed to divert migration from those regions, whereas some countries that perceive metropolitan region growth to be "acceptable" have formulated policies designed to absorb a high proportion of potential rural out-migrants within urban centres in non-metropolitan regions

Policies with regard to non-sedentary pastoral populations (table 20)

72 Non-sedentary populations include: (*a*) nomadic pastoral peoples; (*b*) shifting cultivators, hunters and gatherers, and (*c*) tinkers and craftsmen, such as gypsies. However, the information reviewed in this section is restricted to policies with regard to non-sedentary pastoral nomadic populations located predominantly in the subtropical and temperate deserts of northern Africa and western Asia, and also in the Arctic regions of Europe and Asia.

73 Nomadic pastoral populations are located in 40 countries. In only 10 of these countries is it estimated that they constitute over 10 per cent of the total population. It is estimated that they constitute over 20 per cent of the total in only three countries.

74. Estimates of the total population involved are extremely tentative. However, it appears that nomadic pastoral populations constitute between 1.4 and 1.9 per cent of the world population, between 3.8 and 5 1 per cent of the population of the ECWA region, and between 4 2 and 5 4 per cent of the population of the ECA region. The total world nomadic pastoral population is estimated at between 40 million and 70 million, of which only between 1 5 million and 2.0 million are in the ECWA region, and between 14 million and 19 million in the ECA region.

75 Of the 29 countries for which information is sufficient, only 10 emphasize the provision of social services to the non-sedentary population rather than sedentarization

International migration

Definition of emigration and of categories of Governments' perceptions of the desirability of emigration

76. It is recognized that all Governments exercise some degree of administrative control over nationals who wish to leave the country temporarily or permanently, ranging from an issue of a passport on request with very limited reservations, to substantial requirements concerning financial arrangements, and proof that the potential emigrant is not required within the country for occupational or other reasons. However, the principal interest in this paper is the perception which Governments have of international migration as a significant factor in the modification of national population size, growth and composition.

77. The following classification is used:

(a) *Emigration "permitted"*: Governments formulate no policies and implement no measures, whether direct or indirect, other than administrative controls of the simplest type, explicitly to influence individual decisions either to emigrate or to remain,

(b) *Emigration "encouraged"*: Governments formulate policies and implement measures, either direct or indirect, designed to make more probable than otherwise decisions by a significant proportion of the population to emigrate, and to make easier than otherwise the proce.ses of emigration, including measures facilitating the travel of the individual from his home country, transportation to country of destination and settlement there;

(c) *Emigration "discouraged"*: Governments formulate policies and implement measures, in the form of either direct administrative control or indirect socio-economic policies, explicitly designed to make less probable than otherwise decisions by a significant proportion of the population to emigrate, and to make more difficult than otherwise the processes of emigration.

78. The classification adopted for this paper, and the allocation to categories of the countries included in the study, represents only an initial attempt at analysis of international migration as an integral part of national population policy. Permanent immigration includes all migrants who wish to remain permanently in the country of destination: they are largely, though not entirely, skilled and professional workers and are frequently accompanied by families. Temporary immigration includes all those who intend to return after a short period of time or after the completion of a given task in the country of destination: they are largely, although not entirely, semi-skilled and unskilled workers and are frequently not accompanied by families. It is expected that further work on the topic in progress at the United Nations will result in a much more refined classification system.

Governments' perception of the desirability of intervention to modify current levels or trends of permanent emigration (table 21)

79. Seventy-two countries "discourage" permanent emigration, 61 "permit" it and 15 "encourage" it. Both more developed and less developed countries have similarly small proportions in the "encouraged" category. However, whereas the proportion of more developed countries in the "discouraged" category is considerably less than that in the "permitted" category; the reverse is true of less developed countries.

Governments' perception of the desirability of intervention to modify current levels or trends of temporary emigration (table 22)

80. Higher proportions of countries are favourable to temporary emigration. Fifty-two countries "discourage" temporary emigration, 69 "permit" it, and 27 "encourage" it. Whereas almost a third of more developed countries "discourage" temporary emigration compared to almost two thirds which "permit" it, there is little difference in these proportions in the case of less developed countries.

Definition of immigration and of categories of Governments' perceptions of the desirability of immigration

81. Again it is recognized that all Governments exercise some degree of administrative control over individuals, citizens of other countries, and in some cases their own citizens, wishing to immigrate, either temporarily or permanently. Such controls range from simple passport and routine residence permit controls, to substantial requirements relating to finance, occupational qualifications, political and other affiliation. The following twofold classification has been adopted:

(a) *Immigration "encouraged"*: Governments formulate policies and implement measures, either direct or indirect, designed to make more probable than otherwise decisions by a significant number of the populations of other countries to immigrate, and to make easier than otherwise the processes of immigration, including in some cases measures assisting transportation from country of origin, and in many cases, resettlement and integration with the population of the country of destination;

(b) *Immigration "restricted"*: all other countries.

Governments' perception of the desirability of intervention to modify current levels or trends of permanent immigration (table 23)

82. Some 116 countries "restrict" permanent immigration and 32 "encourage" it. The proportion of more developed countries that "restrict" permanent immigration is much less than that of less developed countries, but is, nevertheless, slightly more than half of all more developed countries.

83. The proportion of countries that "restrict" permanent immigration is equally high in the ECA, ECAFE and ECLA regions, and is lowest in the ECE and ECWA regions.

Governments' perception of the desirability of intervention to modify current levels or trends of temporary immigration (table 24)

84. Some 112 countries "restrict" temporary immigration and 36 "encourage" it. Compared with only 16 per cent of the less developed countries that do so, 45 per cent of more developed countries "encourage" temporary immigration.

85. The highest proportions of countries that "restrict" temporary immigration are in the ECA, ECAFE and ECLA regions. Proportions of countries that encourage temporary immigration are highest in the ECE and ECWA areas.

Demographic structure

86. Definitions of Governments' perceptions of problems associated with demographic structure and policies formulated by them in this regard are still under study.

SUMMARIZING TABLES

87. Tables 2-24 in the annex are intended to summarize the principal aspects of the world situation with regard to Governments' perceptions of population problems and Governments' policies designed to resolve perceived problems.

ANNEX

TABLE 1 DISTRIBUTION OF COUNTRIES INCLUDED IN THE STUDY, BY AREA OF RESPONSIBILITY OF REGIONAL ECONOMIC COMMISSIONS

Area of responsibility of the Economic Commission for				
Africa (ECA)	*Asia and the Far East (ECAFE)*	*Latin America (ECLA)*	*Europe (ECE)*	*Western Asia (ECWA)*
Algeria	Afghanistan	Argentina	Albania	Bahrain
Botswana	Australia	Bahamas	Austria	Democratic Yemen
Burundi	Bangladesh [a]	Barbados	Belgium	Iraq
Central African Republic	Bhutan	Bolivia	Bulgaria	Jordan
Chad	Burma	Brazil	Byelorussian Soviet Socialist Republic	Kuwait
Congo	China	Chile	Canada	Lebanon
Dahomey	Democratic People's Republic of Korea [a]	Colombia	Cyprus	Oman
Egypt	Fiji	Costa Rica	Czechoslovakia	Qatar
Equatorial Guinea	India	Cuba	Denmark	*Saudi Arabia*
Ethiopia	Indonesia	Dominican Republic	Finland	Syrian Arab Republic
Gabon	Iran	Ecuador	France	United Arab Emirates
Gambia	Japan	El Salvador	German Democratic Republic	Yemen
Ghana	Khmer Republic	Guatemala	Germany, Federal Republic of	
Guinea	Laos	Guyana	Greece	
Guinea-Bissau [a]	Malaysia	Haiti	Holy See [a]	
Ivory Coast	Maldives	Honduras	Hungary	
Kenya	Mongolia	Jamaica	Iceland	
Lesotho	Nauru [a]	Mexico	Ireland	
Liberia	Nepal	Nicaragua	Israel	
Libyan Arab Republic	New Zealand	Panama	Italy	
Madagascar	Pakistan	Paraguay	Liechtenstein [a]	
Malawi	Philippines	Peru	Luxembourg	
Mali	Republic of Korea [a]	Trinidad and Tobago	Malta	
Mauritania	Republic of Viet-Nam [a]	Uruguay	Monaco [a]	
Mauritius	Singapore	Venezuela	Netherlands	
Morocco	Sri Lanka		Norway	
Niger	Thailand		Poland	
Nigeria	Tonga [a]		Portugal	
Rwanda	Western Samoa [a]		Romania	
Senegal			San Marino [a]	
Sierra Leone			Spain	
Somalia			Sweden	
South Africa			Switzerland [a]	
Sudan			Turkey	
Swaziland			Ukrainian Soviet Socialist Republic	
Togo			Union of Soviet Socialist Republics	
Tunisia			United Kingdom of Great Britain and Northern Ireland	
Uganda			United States of America	
United Republic of Cameroon			Yugoslavia	
United Republic of Tanzania				
Upper Volta				
Zaire				
Zambia				

[a] Members of one or more specialized agencies but not of the United Nations.

TABLE 2. GOVERNMENTS' PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF NATIONAL POPULATION GROWTH RATES, BY DEVELOPMENTAL STAGE AND REGIONAL ECONOMIC COMMISSION AREA OF RESPONSIBILITY

Developmental stage and regional economic commission area of responsibility	*Governments' perception of the acceptability of current levels or trends of national population growth rates*							
	Rates "acceptable"		*Rates "excessive"*		*Rates "deficient"*		*Total*	
	Number and percentage of countries							
More developed	31	(74)	—	(—)	11	(26)	42	(100)
Less developed	54	(51)	42	(40)	10	(9)	106	(100)
ECA	21	(49)	15	(35)	7	(16)	43	(100)
ECAFE	9	(31)	18	(62)	2	(7)	29	(100)
ECLA	15	(60)	7	(28)	3	(12)	25	(100)
ECE	29	(74)	1	(3)	9	(23)	39	(100)
ECWA	11	(92)	1	(8)	—	(—)	12	(100)
TOTAL	85	(57)	42	(28)	21	(14)	148	(100)
	Percentage of 1970 population							
More developed	25	(82)	—	(—)	5	(18)	30	(100)
Less developed	12	(16)	57	(81)	2	(3)	70	(100)
TOTAL	37		57		7		100	

TABLE 3. GOVERNMENTS' PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF NATIONAL POPULATION GROWTH RATES, BY SIZE OF ESTIMATED 1970 POPULATION

Estimated 1970 population (millions)	*Government's perception of the acceptability of current levels or trends of national population growth rates*							
	Rates "acceptable"		*Rates "excessive"*		*Rates "deficient"*		*Total*	
	Number and percentage of countries							
Under 1.0	20	(66)	7	(24)	3	(10)	30	(100)
1.0-9.9	43	(65)	14	(21)	9	(14)	66	(100)
10.0-49.9	15	(39)	15	(39)	8	(22)	38	(100)
50.0 and over	7	(50)	6	(43)	1	(7)	14	(100)
TOTAL	85	(57)	42	(28)	21	(14)	148	(100)
Average size	15		48		12		24	

TABLE 4. GOVERNMENTS' PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF NATIONAL POPULATION GROWTH RATES, BY STATE OF SPECIFICATION OF QUANTITATIVE POPULATION GROWTH TARGETS AND BY DEVELOPMENTAL STAGE

State of specification of quantitative population targets	*Governments' perception of the acceptability of current levels or trends of national population growth rates*								
	Rates "acceptable"		*Rates "excessive"*		*Rates "deficient"*		*Total*		
	More developed countries	*Less developed countries*	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*Total*
	Number of countries								
Target specified	—	—	—	25	5	1	5	26	31
No target specified	31	54	—	17	6	9	37	80	117
TOTAL	31	54	—	42	11	10	42	106	148
	Percentage of 1970 population								
Target specified	—	—	—	52	2	0	2	52	54
No target specified	25	12	—	5	3	2	28	18	46
TOTAL	25	12	—	57	5	2	30	70	100

TABLE 5. GOVERNMENTS' PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF NATIONAL POPULATION GROWTH RATES, BY ESTIMATED AVERAGE ANNUAL GROWTH RATE, 1970-1975, AND BY DEVELOPMENTAL STAGE

	Governments' perception of the acceptability of current levels or trends of national population growth rates								
	Rates "acceptable"		*Rates "excessive"*		*Rates "deficient"*		*Total*		
Average annual growth rate, 1970-1975	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*Total*
	Number of countries								
2.5 and over	1	38	—	24	—	4	1	67	68
1.5-2.4 ...	2	14	—	17	—	5	2	35	37
Under 1.5	28	2	—	1	11	1	39	4	43
TOTAL	31	54	—	42	11	10	42	106	148
Average growth rate	1	3	—	3	1	2	1	3	2
	Percentage of 1970 population								
2.5 and over	0	10	—	16	—	1	0	27	27
1.5-2.4	1	2	—	41	—	1	1	43	44
Under 1.5	24	0	—	0	5	0	30	0	30
TOTAL	25	12	—	57	5	2	30	70	100

TABLE 6. GOVERNMENTS' PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF NATIONAL POPULATION GROWTH RATES, BY PROJECTED TREND IN GROWTH RATES, 1970-1985, AND BY DEVELOPMENTAL STAGE

	Governments' perception of the acceptability of current levels or trends of national population growth rates								
	Rates "acceptable"		*Rates "excessive"*		*Rates "deficient"*		*Total*		
Projected average annual growth rate 1980-1985, in relation to rate 1970-1975	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*Total*
	Number of countries								
Higher	1	21	—	15	1	6	2	42	44
Same[a]	29	27	—	21	10	2	39	50	89
Lower	1	6	—	6	—	2	1	14	15
TOTAL	31	54	—	42	11	10	42	106	148
	Percentage of 1970 population								
Higher	1	5	—	6	1	1	1	12	12
Same[a]	22	7	—	28	5	0	27	35	62
Lower	3	0	—	23	—	0	3	24	26
TOTAL	25	12	—	56	5	2	30	70	100

[a] Projected average annual growth rate in 1980-1985 within 0.2 per cent of average rate in 1970-1975

TABLE 7. GOVERNMENTS' PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF NATIONAL POPULATION GROWTH RATES, BY POLICIES WITH REGARD TO FERTILITY AND INTERNATIONAL MIGRATION WHICH HAVE A POTENTIAL EFFECT UPON NATIONAL POPULATION GROWTH RATES AND BY DEVELOPMENTAL STAGE

	Governments' perception of the acceptability of current levels or trends of national population growth rates								
	Rates "acceptable"		*Rates "excessive"*		*Rates "deficient"*		*Total*		
Policies with regard to fertility and international migration which have a potential effect upon national population growth rates	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*Total*
	Number of countries								
No intervention in fertility	30	54	—	1	—	3	30	58	88
Stimulate fertility	—	—	—	—	11	7	11	7	18
Limit fertility	1	—	—	41	—	—	1	41	2

TABLE 7 (*continued*)

Policies with regard to fertility and international migration which have a potential effect upon national population growth rates	Governments' perception of the acceptability of current levels or trends of national population growth rates: Rates "acceptable"		Rates "excessive"		Rates "deficient"		Total		
	More developed countries	Less developed countries	More developed countries	Less developed countries	More developed countries	Less developed countries	More developed countries	Less developed countries	Total
"Discourage" emigration[a]	5	29	—	1	10	10	15	40	55
"Permit" emigration[a]	22	21	—	24	1	—	23	45	68
"Encourage" emigration[a]	4	4	—	17	—	—	4	21	25
"Restrict" immigration[a]	16	43	—	41	6	5	22	89	111
"Encourage" immigration[a]	15	11	—	1	5	5	20	17	37
TOTAL	31	54	—	42	11	10	42	106	148

[a] Whether permanent or temporary or both; hence, cannot be compared directly with the information provided in tables 21-24.

TABLE 8. POTENTIAL EFFECT OF GOVERNMENTS' POLICIES WITH REGARD TO FERTILITY AND INTERNATIONAL MIGRATION UPON NATIONAL POPULATION GROWTH RATES, BY DEVELOPMENTAL STAGE AND REGIONAL ECONOMIC COMMISSION AREA OF RESPONSIBILITY

Developmental stage and regional economic commission area of responsibility	Potential effect of governmental policies with regard to fertility and international migration upon national population growth rates: No intervention		To limit growth rates		To promote growth rates		Contradictory		Total	
Number and percentage of countries										
More developed	10	(24)	4	(10)	28	(66)	—	(—)	42	(100)
Less developed	19	(18)	43	(41)	43	(41)	1	(1)	106	(100)
ECA	10	(23)	14	(33)	18	(42)	1	(2)	43	(100)
ECAFE	4	(14)	18	(61)	7	(24)	—	(—)	29	(100)
ECLA	5	(20)	8	(32)	12	(48)	—	(—)	25	(100)
ECE	9	(23)	5	(13)	25	(64)	—	(—)	39	(100)
ECWA	1	(8)	2	(17)	9	(75)	—	(—)	12	(100)
TOTAL	29	(20)	47	(32)	71	(48)	1	(1)	148	(100)
Percentage of 1970 population										
More developed	5	(17)	2	(7)	23	(76)	—	(—)	30	(100)
Less developed	4	(6)	55	(79)	10	(14)	1	(1)	70	(100)
TOTAL	9		57		33		1		100	

TABLE 9. POTENTIAL EFFECT OF GOVERNMENTS' POLICIES WITH REGARD TO FERTILITY AND INTERNATIONAL MIGRATION UPON NATIONAL POPULATION GROWTH RATES, BY GOVERNMENTS' PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF NATIONAL POPULATION GROWTH RATES AND BY DEVELOPMENTAL STAGE

Governments' perception of the acceptability of current levels or trends of national population growth rates	Potential effect of governmental policies with regard to fertility and international migration upon national population growth rates: No intervention		To limit growth rates		To promote growth rates		Contradictory		Total	
	More developed countries	Less developed countries	More developed countries	Less developed countries	More developed countries	Less developed countries	More developed countries	Less developed countries	More developed countries	Less developed countries
Number of countries										
Rates "acceptable"	10	17	4	4	17	33	—	—	31	54
Rates "excessive"	—	2	—	39	—	—	—	1	—	42
Rates "deficient"	—	—	—	—	11	10	—	—	11	10
TOTAL	10	19	4	43	28	43	—	1	42	106

TABLE 10. ESTIMATED AVERAGE NATIONAL LIFE EXPECTANCY AT BIRTH, 1970-1975, BY DEVELOPMENTAL STAGE AND REGIONAL ECONOMIC COMMISSION AREA OF RESPONSIBILITY

Developmental stage and regional economic commission area of responsibility	*Estimated average national life expectancy at birth, 1970-1975*											
	Under 40 years		*40-49 years*		*50-59 years*		*60-69 years*		*Over 70 years*		*Total*	
	Number and percentage of countries											
More developed	—	(—)	—	(—)	—	(—)	9	(21)	33	(79)	42	(100)
Less developed	4	(4)	46	(43)	27	(25)	24	(23)	5	(5)	106	(100)
ECA	4	(9)	30	(70)	8	(19)	1	(2)	—	(—)	43	(100)
ECAFE	—	(—)	11	(38)	6	(20)	7	(24)	5	(17)	29	(100)
ECLA	—	(—)	2	(8)	7	(28)	14	(56)	2	(8)	25	(100)
ECE	—	(—)	—	(—)	1	(3)	7	(18)	31	(79)	39	(100)
ECWA	—	(—)	3	(25)	5	(42)	4	(33)	—	(—)	12	(100)
TOTAL	4	(3)	46	(31)	27	(18)	33	(22)	38	(26)	148	(100)

TABLE 11 GOVERNMENTS' PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF NATIONAL POPULATION GROWTH RATES, BY REPORTED OR ESTIMATED LIFE EXPECTANCY AT BIRTH, 1970-1975, AND BY DEVELOPMENTAL STAGE

Estimated life expectancy at birth, 1970-1975	*Governments' perception of the acceptability of current levels or trends of national population growth rates*							
	Rates "acceptable"		*Rates "excessive"*		*Rates "deficient"*		*Total*	
	More developed countries	*Less developed countries*	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*
	Number of countries							
35-39	—	1	—	2	—	1	—	4
40-44	—	20	—	10	—	5	—	35
45-49	—	9	—	5	—	1	—	15
50-54	—	8	—	7	—	1	—	16
55-59	—	3	—	6	—	—	—	9
60-64	1	3	—	4	—	2	1	9
65-69	3	6	—	7	6	—	9	13
70-74	27	4	—	1	5	—	32	5
TOTAL	31	54	—	42	11	10	42	106
Average life expectancy	72	49	—	54	70	48	71	52

TABLE 12 GOVERNMENTS' PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF AVERAGE NATIONAL FERTILITY RATES AND PERCEPTION OF THE DESIRABILITY OF INTERVENTION TO MODIFY FERTILITY RATES, BY DEVELOPMENTAL STAGE AND REGIONAL ECONOMIC COMMISSION AREA OF RESPONSIBILITY

Developmental stage and regional economic commission area of responsibility	*Governments' perception of the acceptability of current levels or trends of average national fertility rates and perception of the desirability of intervention to modify fertility rates*							
	Rates "acceptable" intervention undesirable		*Rates "excessive" intervention desirable to limit fertility*		*Rates "deficient" intervention desirable to stimulate fertility*		*Total*	
	Number and percentage of countries							
More developed	30	(71)	1	(2)	11	(26)	42	(100)
Less developed	58	(55)	41	(39)	7	(7)	106	(100)
ECA	24	(56)	14	(33)	5	(12)	43	(100)
ECAFE	9	(31)	18	(62)	2	(7)	29	(100)
ECLA	17	(68)	7	(28)	1	(4)	25	(100)
ECE	27	(69)	2	(5)	10	(26)	39	(100)
ECWA	11	(92)	1	(8)	—	(—)	12	(100)
TOTAL	88	(59)	42	(28)	18	(12)	148	(100)
	Percentage of 1970 population							
More developed	*24*	*(78)*	*1*	*(3)*	*6*	*(20)*	*30*	*(100)*
Less developed	*12*	*(17)*	*56*	*(80)*	*1*	*(1)*	*70*	*(100)*
TOTAL	*35*		*57*		*8*		*100*	

TABLE 13. GOVERNMENTS' PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF AVERAGE NATIONAL FERTILITY RATES AND PERCEPTION OF THE DESIRABILITY OF INTERVENTION TO MODIFY FERTILITY RATES, BY ESTIMATED CRUDE BIRTH RATES, 1970-1975, AND BY DEVELOPMENTAL STAGE

	Governments' perception of the acceptability of current levels or trends of average national fertility rates, and perception of the desirability of intervention to modify fertility rates								
	Rates "acceptable": intervention undesirable		*Rates "excessive": intervention desirable to limit fertility*		*Rates "deficient": intervention desirable to stimulate fertility*		*Total*		
Estimated crude birth rates, 1970-1975	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*Total*
	Number of countries								
10-19	25	—	1	—	9	—	35	—	35
20-29	4	6	—	9	2	—	6	15	21
30-39	1	9	—	4	—	3	1	16	17
40-49	—	37	—	27	—	4	—	68	68
50-59	—	6	—	1	—	—	—	7	7
TOTAL	30	58	1	41	11	7	42	106	148
Average crude birth rate	12	42	15	40	17	41	17	41	35

TABLE 14. GOVERNMENTS' POLICIES WITH REGARD TO THEIR INVOLVEMENT IN THE PROVISION OF FAMILY PLANNING SERVICES, BY DEVELOPMENTAL STAGE AND REGIONAL ECONOMIC COMMISSION AREA OF RESPONSIBILITY

	Policy of Government with regard to its involvement in the provision of family planning services									
Developmental stage and regional economic commission area of responsibility	*"Restrict" aspects of production or distribution of modern contraceptives*		*"Accept" family planning activities of private organizations and local authorities*		*"Support" family planning activities of private organizations and local authorities*		*"Sponsor" family planning activities in public programmes*		*Total*	
	Number and percentage of countries									
More developed countries	6	(14)	6	(14)	7	(17)	23	(55)	42	(100)
Less developed countries	2	(2)	44	(42)	9	(8)	51	(48)	106	(100)
ECA	2	(5)	24	(56)	6	(14)	11	(26)	43	(100)
ECAFE	—	(—)	4	(14)	1	(3)	24	(83)	29	(100)
ECLA	1	(4)	7	(28)	2	(8)	15	(60)	25	(100)
ECE	5	(13)	7	(18)	6	(15)	21	(54)	39	(100)
ECWA	—	(—)	8	(67)	1	(8)	3	(25)	12	(100)
TOTAL	8	(5)	50	(34)	16	(11)	74	(50)	148	(100)
	Percentage of 1970 population									
More developed countries	2		3		3		22		30	
Less developed countries	0		8		3		59		70	
TOTAL	2		11		6		81		100	

[illegible] POLICIES WITH REGARD TO THEIR INVOLVEMENT IN THE PROVISION OF FAMILY PLANNING SERVICES BY PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF AVERAGE NATIONAL FERTILITY RATES, BY PERCEPTION OF THE DESIRABILITY OF INTERVENTION TO MODIFY RATES AND BY DEVELOPMENTAL STAGE

Governments' perception of the acceptability of current levels or trends of average national fertility rates and perception of the desirability of intervention to modify fertility rates		Policy of Government with regard to its involvement in the provision of family planning services									
		"Restrict" aspects of production or distribution of modern contraceptives		"Accept" family planning activities of private organizations and local authorities		"Support" family planning activities of private organizations and local authorities		"Sponsor" family planning activities in public programmes		Total	
		Number and percentage of countries									
Rates "acceptable" intervention undesirable	More developed countries	3	(10)	4	(13)	7	(23)	16	(53)	30	(100)
	Less developed countries	1	(2)	39	(67)	6	(11)	12	(21)	58	(100)
	TOTAL	4	(6)	43	(49)	13	(15)	28	(32)	88	(100)
Rates "excessive", intervention desirable to limit fertility	More developed countries	—	(—)	—	(—)	—	(—)	1	(100)	1	(100)
	Less developed countries	—	(—)	3	(7)	2	(5)	36	(87)	41	(100)
	TOTAL	—	(—)	3	(7)	2	(5)	37	(88)	42	(100)
Rates "deficient": intervention desirable to stimulate fertility	More developed countries	3	(27)	2	(18)	—	(—)	6	(55)	11	(100)
	Less developed countries	1	(14)	2	(29)	1	(14)	3	(43)	7	(100)
	TOTAL	4	(22)	4	(22)	1	(6)	9	(50)	18	(100)
TOTAL		8	(5)	50	(34)	16	(11)	74	(50)	148	(100)

TABLE 16. GOVERNMENTS' POLICIES WITH REGARD TO INDUCED ABORTION AND VOLUNTARY STERILIZATION, BY PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF AVERAGE NATIONAL FERTILITY RATES AND PERCEPTION OF THE DESIRABILITY OF INTERVENTION TO MODIFY FERTILITY RATES AND BY DEVELOPMENTAL STAGE

Governments' perception of the acceptability of current levels or trends of average national fertility rates and perception of the desirability of intervention to modify fertility rates		Induced abortion on the basis of medico-social and social indications or upon request				Voluntary sterilization				Total	
		Legal		Not legal		Clearly legal		Legal status unclear or not legal			
		Number and percentage of countries									
Rates "acceptable", intervention undesirable	More developed countries	15	(50)	15	(50)	10	(33)	20	(67)	30	(100)
	Less developed countries	6	(10)	52	(90)	4	(7)	54	(93)	58	(100)
Rates "excessive": intervention desirable to limit fertility	More developed countries	—	(—)	1	(100)	—	(—)	1	(100)	1	(100)
	Less developed countries	7	(17)	34	(83)	10	(24)	31	(76)	41	(100)
Rates "deficient": intervention desirable to stimulate fertility	More developed countries	6	(55)	5	(45)	—	(—)	11	(100)	11	(100)
	Less developed countries	1	(14)	6	(86)	—	(—)	7	(100)	7	(100)
TOTAL	More developed countries	21	(50)	21	(50)	10	(24)	32	(76)	42	(100)
	Less developed countries	14	(13)	92	(87)	14	(13)	92	(87)	106	(100)
	TOTAL	35	(24)	113	(76)	24	(16)	124	(84)	148	(100)

SOURCES: International Planned Parenthood Federation, *IPPF News*, Supplement, 216 (March 1972), and subsequent issues; Department of Medical and Public Affairs, The George Washington University Medical Center, Washington, D.C., *Population Report*, Series F, No. 1, April 1973, Transnational Family Research Institute International Reference Center for Abortion Research, *Abortion Research Notes*. For voluntary sterilization, Department of Medical and Public Affairs, The George Washington University Medical Center, Washington, D.C., *Population Report*, Series C-D, No. 2, April 1973.

TABLE 17. GOVERNMENTS' PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF METROPOLITAN REGION POPULATION GROWTH RATES, BY DEVELOPMENTAL STAGE AND REGIONAL ECONOMIC COMMISSION AREA OF RESPONSIBILITY

Developmental stage and regional economic commission area of responsibility	*Governments' perception of the acceptability of current levels or trends of metropolitan region population growth rates*					
	Rates "acceptable"		*Rates "excessive"*		*Total*	
	Number and percentage of countries					
More developed	16	(47)	18	(53)	34	(100)
Less developed	49	(50)	49	(50)	98	(100)
ECA	19	(46)	22	(54)	41	(100)
ECAFE	13	(50)	13	(50)	26	(100)
ECLA	11	(46)	13	(54)	24	(100)
ECE	16	(52)	15	(48)	31	(100)
ECWA	6	(60)	4	(40)	10	(100)
TOTAL	65	(48)	67	(52)	132	(100)[a]
	Percentage of 1970 population					
More developed	19	(66)	10	(34)	30	(100)
Less developed	12	(17)	58	(83)	70	(100)
TOTAL	31		68		100[a]	

[a] Excluding four less developed and three more developed countries for which information is insufficient, and four less developed and five more developed countries whose territorial size is so small (less than 1,000 km^2) that the whole national territory is within the metropolitan region. The sum of their population is less than 0.5 per cent of the total.

TABLE 18. GOVERNMENTS' PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF METROPOLITAN REGION POPULATION GROWTH RATES, BY PERCEPTION OF ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF NATIONAL POPULATION GROWTH RATES AND BY URBANIZATION CHARACTERISTICS AND DEVELOPMENTAL STATE

Governments' perception of the acceptability of current levels and trends of national population growth rates and urbanization characteristics	*Governments' perception of the acceptability of current levels or trends of metropolitan region population growth rates*						
	Rates "acceptable"		*Rates "excessive"*		*Total*		
	More developed countries	*Less developed countries*	*More developed countries*	*Less developed countries*	*More developed countries*	*Less developed countries*	*Total*
	Number of countries						
National population growth:							
"Acceptable"	13	28	10	21	23	49	72
"Excessive"	—	17	—	24	—	41	41
"Deficient"	3	4	8	4	11	8	19
Urban percentage of total population							
0-19	—	22	—	17	—	39	39
20-39	3	16	—	18	3	34	37
40-59	6	10	7	12	13	22	35
60-79	4	1	8	2	12	3	15
80-100	3	—	3	—	6	—	6
Estimated urban population growth rates							
0.0-1.9	9	—	8	—	17	—	17
2.0-3.9	5	5	10	4	15	9	24
4.0-5.9	2	22	—	25	2	47	49
6.0 and over	—	2	—	6	—	8	8
No information	—	20	—	14	—	34	34
Relative size of metropolitan centre:							
Primate[a]	5	33	15	39	20	72	92
Non-primate	11	16	3	10	14	26	40
TOTAL	16	49	18	49	34	98	132[b]

[a] A primate condition is defined as existing when the largest urban centre has a population more than 2.5 times larger than that of the second largest urban centre.

[b] See table 17, foot-note [a].

TABLE 19 GOVERNMENTS' POLICIES WITH REGARD TO REDISTRIBUTION OF NATIONAL POPULATION, BY GOVERNMENTS' PERCEPTION OF THE ACCEPTABILITY OF CURRENT LEVELS OR TRENDS OF METROPOLITAN REGION POPULATION GROWTH RATES AND BY URBANIZATION CHARACTERISTICS AND DEVELOPMENTAL STAGE

Developmental stage, Governments' perception of the acceptability of current levels or trends in metropolitan region population growth rates and urbanization characteristics	*Internal migration from rural areas to urban centres permitted*							
	And no policies formulated to divert migration from metropolitan regions		*But policies formulated to divert migration into urban centres in non-metropolitan regions*		*Internal migration to urban centres discouraged*		*Total*	
	Number and percentage of countries							
Developmental stage								
More developed countries	4	(12)	30	(88)	—	(—)	34	(100)
Less developed countries	43	(44)	46	(47)	9	(10)	98	(100)
Metropolitan growth								
"Acceptable"	30	(46)	31	(48)	4	(6)	65	(100)
"Excessive"	17	(25)	45	(67)	5	(7)	67	(100)
Relative size of metropolitan centre								
Primate [a]	37	(40)	47	(51)	8	(10)	92	(100)
Non-primate	10	(24)	29	(72)	1	(2)	40	(100)
Urban percentage of total								
0-19	22	(56)	14	(36)	3	(8)	39	(100)
20-39	13	(36)	22	(60)	2	(5)	37	(100)
40-59	7	(20)	24	(68)	4	(11)	35	(100)
60-79	4	(27)	11	(74)	—	(—)	15	(100)
80-100	1	(17)	5	(84)	—	(—)	6	(100)
TOTAL	47	(36)	76	(58)	9	(8)	132	(100)
	Percentage of 1970 population							
More developed countries	7		23		—		30[b]	
Less developed countries	28		37		5		69[b]	
TOTAL	35		60		5		99[b]	

[a] See table 18, foot-note [a].
[b] See table 17, foot-note [a].

TABLE 20 POLICIES WITH REGARD TO NON-SEDENTARY PASTORAL POPULATIONS BY RELATIVE SIZE OF NON-SEDENTARY POPULATION AND BY DEVELOPMENTAL STAGE

Estimated proportion of total population non-sedentary and developmental stage	*Policies with regard to non-sedentary pastoral populations*				
	Sedentarization emphasized	*Provision of economic and social services emphasized*	*No intervention*	*Insufficient information*	*Total*
	Number of countries				
Under 10 per cent total population	11	7	1	11	30
Over 10 per cent total population	7	3	—	—	10
More developed countries	3	3	—	2	8
Less developed countries	15	7	1	9	32
TOTAL	18	10	1	11	40

TABLE 21. GOVERNMENTS' PERCEPTION OF THE DESIRABILITY OF INTERVENTION TO MODIFY LEVELS OR TRENDS OF PERMANENT EMIGRATION, BY DEVELOPMENTAL STAGE AND REGIONAL ECONOMIC COMMISSION AREA OF RESPONSIBILITY

Developmental stage and regional economic commission area of responsibility	*Governments' perception of the desirability of intervention to modify current levels or trends of permanent emigration*							
	Permanent emigration "discouraged"		*Permanent emigration "permitted"*		*Permanent emigration "encouraged"*		*Total*	
	Number and percentage of countries							
More developed	15	(36)	24	(57)	3	(7)	42	(100)
Less developed	57	(54)	37	(35)	12	(12)	106	(100)
ECA	36	(84)	3	(7)	4	(9)	43	(100)
ECAFE	3	(10)	25	(83)	1	(7)	29	(100)
ECLA	13	(52)	6	(24)	6	(24)	25	(100)
ECE	13	(33)	23	(59)	3	(8)	39	(100)
ECWA	7	(58)	4	(33)	1	(8)	12	(100)
TOTAL	72	(48)	61	(41)	15	(11)	148	(100)

TABLE 22. GOVERNMENTS' PERCEPTION OF THE DESIRABILITY OF INTERVENTION TO MODIFY LEVELS OR TRENDS OF PERMANENT EMIGRATION, BY DEVELOPMENTAL STAGE AND REGIONAL ECONOMIC COMMISSION AREA OF RESPONSIBILITY

Developmental stage and regional economic commission area of responsibility	*Governments' perception of the desirability of intervention to modify current levels or trends of temporary emigration*							
	Temporary emigration "discouraged"		*Temporary emigration "permitted"*		*Temporary emigration "encouraged"*		*Total*	
	Number and percentage of countries							
More developed	13	(31)	25	(60)	4	(9)	42	(100)
Less developed	40	(38)	43	(40)	23	(22)	106	(100)
ECA	18	(42)	14	(33)	11	(26)	43	(100)
ECAFE	4	(14)	24	(83)	1	(3)	29	(100)
ECLA	12	(48)	5	(20)	8	(32)	25	(100)
ECE	11	(28)	23	(40)	5	(13)	39	(100)
ECWA	7	(58)	3	(25)	2	(17)	12	(100)
TOTAL	52	(35)	69	(47)	27	(19)	148	(100)

TABLE 23. GOVERNMENTS' PERCEPTION OF THE DESIRABILITY OF INTERVENTION TO MODIFY LEVELS OR TRENDS OF PERMANENT IMMIGRATION, BY DEVELOPMENTAL STAGE AND REGIONAL ECONOMIC COMMISSION AREA OF RESPONSIBILITY

Developmental stage and regional economic commission area of responsibility	*Governments' perception of the desirability of intervention to modify current levels or trends of permanent immigration*					
	Permanent immigration "restricted"		*Permanent immigration "encouraged"*		*Total*	
	Number and percentage of countries					
More developed	22	(52)	20	(48)	42	(100)
Less developed	94	(89)	12	(11)	106	(100)
ECA	39	(91)	4	(9)	43	(100)
ECAFE	27	(93)	2	(7)	29	(100)
ECLA	22	(88)	3	(12)	25	(100)
ECE	22	(55)	17	(45)	39	(100)
ECWA	6	(50)	6	(50)	12	(100)
TOTAL	116	(78)	32	(22)	148	(100)

TABLE 24 GOVERNMENTS' PERCEPTION OF THE DESIRABILITY OF INTERVENTION TO MODIFY LEVELS OR TRENDS OF TEMPORARY IMMIGRATION, BY DEVELOPMENTAL STAGE AND REGIONAL ECONOMIC COMMISSION AREA OF RESPONSIBILITY

Developmental stage and regional economic commission area of responsibility	*Governments' perception of the desirability of intervention to modify current levels or trends of temporary immigration*					
	Temporary immigration "restricted"		*Temporary immigration "encouraged"*		*Total*	
	Number and percentage of countries					
More developed	23	(55)	19	(45)	42	(100)
Less developed	89	(84)	17	(16)	106	(100)
ECA	37	(86)	6	(14)	43	(100)
ECAFE	26	(90)	3	(10)	29	(100)
ECLA	23	(92)	2	(8)	25	(100)
ECE	21	(54)	18	(46)	39	(100)
ECWA	5	(42)	7	(58)	12	(100)
TOTAL	112	(76)	36	(24)	148	(100)

POLITICAL IMPLICATIONS OF POPULATION DYNAMICS: A CRITICAL ASSESSMENT

Nazli Choucri *

1. While it is generally recognized that excessive population growth places severe strains upon the environment, there is also some reason to believe that population levels and rates of increase may be important elements affecting national power, war and peace, and the nature of social and political organization. This paper attempts to evaluate existing evidence concerning the political implications of population dynamics, note areas of ambiguity and suggest possible avenues for further research.

THE INTERDEPENDENCE OF POPULATION AND POLITICS

2. Many uncertainties remain concerning the precise nature of the population problem in the world today. However, it is clear that the world population is continuing to grow at an alarming pace, imposing increasing burdens upon available resources. From the historical record, it may be inferred that, at each stage of man's population growth, the resulting reverberations on government have necessitated readjustments and reassements of governmental procedures. [1] Although the precise political implications of population dynamics are as yet far from clear, to the extent that the world population continues to grow as projected, further strains on political, social and economic institutions (at all levels) may be expected. [2]

3. Concern for the political implications of population variables has been expressed by many classical political theorists, but the seeming ability of technology to invalidate the Malthusian dynamic accentuated a general inclination to overlook the political implications of demographic problems. [3] Only recently have political analysts turned their attention once more to the effects of added numbers. But the general tendency to date has been either to over-react to the seemingly overwhelming problems associated with population growth, attributing to it many of today's social, economic and political ills, or to under-react, by continuing to view politics as an autonomous phenomenon, divorced from its demographic and ecological context. [4] As a result, few studies exist which are addressed specifically to the relationship between population and politics. [5]

4. Much of the evidence concerning the political implications of population dynamics is still insufficient to provide any conclusive answers. The diversity of views [6] on the population question (including the Malthusian, Marxist, radical and more recent social science perspectives upon the causes and consequences of rapid population growth) render it all the more

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[1] Specific illustrations can be found in A. J. Toynbee, *A Study of History* (London, Oxford University Press, 1934), especially vol. III with respect to the case of Athens, p. 122; see also K. H. Wittfogel, *Oriental Despotism: A Comparative Study of Total Power* (New Haven, Conn., Yale University Press, 1957); E. R. Service, *Primitive Social Organization* (New York, Random House, 1965); and R. L. Carneiro, "On the relationship between size of population and complexity of social organization", Southwestern Journal of Anthropology vol. 23 (August 1967), pp. 234-243.

[2] General references for these issues are found in R. C. North and N. Choucri, "Population and the international system: some implications for United States policy and planning", in Commission on Population Growth and the American Future, *Governance and Population: The Governmental Implications of Population Change*, vol. IV of the Commission's report (Washington, D.C., 1972), pp. 251-278. See also D. E. Drummond, "Population growth and cultural change", *Southwestern Journal of Anthropology*, vol. 21, No. 4 (Winter 1965), pp. 302-324; and M. J. Harner, "Population pressure and the social evolution of agriculturists", *Southwestern Journal of Anthropology* (Spring 1970), pp. 67-86.

[3] Plato, Aristotle, Rousseau, Montesquieu and the mercantilists all derived political implications from the number and distribution of population, as did scholars of the classical Arabic tradition like Ibn Khaldon. See also E. P. Hutchinson, *The Population Debate* (Boston, Houghton Mifflin Co., 1967), for a survey of population theories until 1900; R. H. Davidson, "Population change and representative government", in Commission on Population Growth and the American Future, *Governance and Population* ..., vol. IV of the Commission's report, especially pp. 61-67; and *The Determinants and Consequences of Population Trends* (United Nations publication, Sales No. 71.XIII.5).

[4] For a series of essays bearing on such issues, see W. Anderson, ed., *Politics and Environment: A Reader in Ecological Crisis* (Pacific Palisades, California, Goodyear Publishing Co., 1970).

[5] See in this regard M. Macura and M. A. El-Badry, "Diversity or uniformity of demographic problems? A medium-range outlook", in E. Szabady, ed., *World Views of Population Problems* (Budapest, Akadémiai Kiadó, 1968), pp. 197-208; O. Harkavy, "Population growth: some economic problems", in W. E. Moran, Jr., ed., *Population Growth: Threat to Peace?* (New York, P. J. Kenedy and Sons, 1965), pp. 105-118.

[6] Illustrative works include N. W. Chamberlain, *Beyond Malthus: Population and Power* (New York, Basic Books, 1970); J. M. Stycos, "Population and population control in Latin America", *World Politics*, vol. 20, No. 1 (October 1967), pp. 66-82; W. Barclay, J. Enright and R. T. Reynolds, "Population control in the third world", *NACLA Newsletter*, vol. IV, No. 8 (December 1970) (for a radical perspective); T. G. Saunders, "Opposition to family planning in Latin America: the non-Marxist left", *West Coast South America Studies*, vol. XVII, No. 5 (1970); C. Culligan, "Punta del Este, 1961-1967: early dawn of a demographic awakening", *Population Bulletin*, vol. XXIII, No. 3 (June 1967), pp. 45-83.

imperative that the evidence relating population to politics be assessed critically. In the course of such assessments, the conventional bounds of demographic analysis should be broadened to take explicit cognizance of the resources and technology of a society, which place population in a societal perspective, and to highlight important differences between the implications of population variables in less developed States and those in advanced industrial societies. In both cases, however, the effects of population are mediated through a complex network of intervening processes, the nature of which is not yet well understood. Indeed, population factors often generate reverberating effects throughout the social system, which are generally very complex. Furthermore, these effects are often characterized by long time-lags, rarely becoming apparent in the short range. Any analysis must therefore acknowledge the importance of the time factor by seeking to identify the short- and long-range effects of population and the policies most appropriate to different time-frames

5. The lack of reliable statistical data concerning demographic structure in many parts of the world makes assessment of the implications of population dynamics more difficult There are also marked ambiguities and inconsistencies concerning the definition of "optimum" population The basic question is "optimum" with respect to what. Since the economic optimum is not necessarily congruent with the military or political optimum, and since at the level beyond mere subsistence the optimum is culturally and sociologically defined, it is especially difficult to employ this notion with any degree of precision for analysis or for policy planning.[7]

6 The distinction between actual demographic conditions and their political implications, on the one hand, and the perception of these conditions by national political leaders, on the other, is always important.[8] Identifying the connexion between the subjective and the objective is a major challenge; but it would be a mistake to assume a necessary congruence between the two, or that one invariably leads to the other.[9] Any relationship between population and politics will almost surely be complex.

POPULATION AND GOVERNANCE: SOME INSTITUTIONAL IMPLICATIONS

7. A recent survey[10] of prevailing arguments and assumptions with regard to the political implications of population dynamics concluded that:

(*a*) Added population generates demands for increases in housing, education, health services, and so forth;

(*b*) Resource constraints in less developed countries are such that those of the lowest socio-economic status will not be incorporated in governmental attempts to meet rising demands;

(*c*) Governmental institutions may be influenced by population change;

(*d*) Population policy will become an increasingly sensitive issue, particularly in multi-ethnic communities,

(*e*) Effects upon the labour force of added population could provide a mass base upon which political organizers might draw,

(*f*) Numbers affect a country's political culture and modes of political conduct;

(*g*) Governments might consciously exploit population as a political issue,

(*h*) The discourse concerning the development of population policies will invariably become more political than it has to date.

8. The burden of existing evidence suggests that the larger the population, the greater the number and nature of government services needed, but the precise relationship between size and government services is difficult to determine.[11] All other factors being equal, however, public services are strained once population exceeds a certain threshold in terms of level and rate of changes, although again, the precise nature of this threshold has never been demonstrated persuasively [illegible]

governmental services, particularly when the resources available to the polity are not commensurate with the demands generated

9. Such demands often influence legislative institutions As increased numbers place added loads on government, performance may be affected, potentially generating citizen alienation. Shifts in the distribution of population also affect the kinds of problems Govern-

[7] See, for example, A Sauvy, *General Theory of Population* (New York, Basic Books, 1969), pp 16-65, D J Elazar, "Population growth and the federal system", in Commission [illegible] *[illegible]rnance* [illegible] report, [illegible] Mac- [illegible] *re an* [illegible] w-Hill, 1971); A S. David and Huang Ching ju, "Population theory and the concept of optimum population", *Socio-Economic* [illegible]

[illegible] implications of population dynamics, see K. Davis, "The political impact of new population trends", *Foreign Affairs*, vol 36, No 2 (January 1956), pp 293-301.

[9] For an [illegible] in northeas[illegible] *Economic* [illegible] part I (Jul[illegible]

[10] M Weiner, "Political demography: an inquiry into the political consequences of population change", in *Rapid Population Growth: Consequences and Policy Implications* (Baltimore, Johns Hopkins Press, 1971), vol. II, especially pp 607-613.

[11] See also the essays in Commission on Population Growth and the American Future, *Governance and Population. The Governmental Implications of Population Change*, vol IV [illegible] the Commission's report (Washington, D C [illegible]

ments face.[12] Inability to satisfy rising expectations is likely to lead to changes in governmental institutions. The way in which this change comes about or what the new structures will be like, however, is a matter for speculation. A recent study argues that representative institutions may be bypassed altogether.[13]

10. The effects of population change on costs of governance are equally hard to discern. Although rapid and consistently high changes invariably place strains on governmental capabilities—both financial and administrative—it is not plausible to assume a direct proportionate relationship between population increase and increase in governmental costs.[14] Often, the rate of increase in governmental cost, particularly at the local level, appears to be greater than the corresponding rate of increase in population. This relationship differs according to the types and extent of services provided to the community, the financial resources available to government and prevailing levels of knowledge and skills in the society.

11. Some efforts have been made to evaluate the financial costs of added population,[15] the effects of population upon education,[16] and the effects of added population upon economic performance and political development.[17] Yet, similar calculations do not yet exist for the implications of rapid increases in numbers—or changes in their composition or distribution—upon governmental services or upon economic sectors.

POPULATION SIZE AND NATIONAL POWER [18]

12. Political analysts generally argue that population size is a relevant factor in the over-all power calculus of a country; but there is, again, little empirical evidence indicating precisely how the size of the population adds to or detracts from its over-all capabilities, economic or military. Those who argue for the simple number-power proposition do so on four grounds. The larger a society's human resources, the greater is the possibility of increasing its effective labour force; the larger the size of the military force, the greater are the probabilities that numbers will generate sentiments of nationalism and national cohesion; and the greater are development possibilities, particularly if economies of scale prevail. On face value, all four arguments appear plausible, but they are fraught with logical and empirical inconsistencies. The fact that an increase in numbers may be channelled into the labour force or the military, or result in economies of scale, or generate sentiments of national cohesion does not assure that this will occur. Other conditions must be present before such outcomes materialize. That international recognition is often accorded on a size principle simply adds to the complexities involved. There are also some obvious trade-offs between size as an asset and size as a liability, and between size as a constraint to economic development and size as a determinant of military capability. Because countries often increase their territory primarily through conquest, it may even be difficult to distinguish between size as a cause of power and size as its consequence.

13. In addition, the importance of such variables as national cohesion, technological capability, military effectiveness, the capacity to absorb military casualties and the development of human resources all condition the extent to which sheer size is critical. Trade-off calculations are invariably complex, leading to alternative solutions; it is not possible to assign a simple numerical value to population size so as to quantify power in social, economic and political terms. No one has yet devised a way of measuring power or power relations empirically. From a purely statistical point of view, however, population size does feature prominently as an indicator of national power in two ways: first, the size variable loads strongly on the power dimension in factor analysis; secondly, size tends to correlate positively and significantly with other measures of capability.[19]

14. Once technology is entered in the power calculus, any simple relation between population and power disappears. Technological advances have revolutionized the conduct of warfare and the expectations of the parties during the course of violence. The fact that technology can be imported and substantial changes in capability brought about in short order makes technology more critical than size in any power assessment, but also makes such calculations far more volatile. However, the advent of nuclear weapons has added a new dimension to the size factor; placing at risk population centres has become perhaps as valuable as placing at risk the opponent's men under arms. In these

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[12] R. Lehne, "Population Change and Congressional Representation", in Commission on Population Growth and the American Future, *op. cit.*, vol. IV, pp. 83-98.

[13] *Ibid.* See also Commission on Population Growth and the American Future, *op. cit.*, essays in vol. IV, part II, pp. 109-228.

[14] R. H. Davidson, "Population change and representative government", *loc. cit.*, pp. 59-82; see especially p. 79.

[15] T. J. Espenshade, *The Price of Children and Socio-Economic Theories of Fertility*, Population Reprint Series, Demography, No. 410 (Berkeley, California, International Population and Urban Research, 1972); and W. J. Leasure, "Some economic benefits of birth prevention", *Milbank Memorial Fund Quarterly*, vol. XLV, No. 4 (October 1967).

[16] E. E. Arriaga, *Impact of Population Changes on Education Cost*, Population Reprint Series, Demography, No. 402 (Berkeley, California, International Population and Urban Research, 1972). See also D. M. Heer, "Economic development and fertility", *Demography*, vol. 3, No. 2 (1966), pp. 423-444.

[17] M. Weiner, *loc. cit.*

[18] A synthesis of the literature on population and international power is found in N. Choucri, *Population Dynamics and International Violence: Propositions, Insights, and Evidence* (Cambridge, Mass., Massachusetts Institute of Technology, Center for International Studies, 1973); this section draws upon the analysis in pp. 51-85. See especially A. Wright, *A Study of War*, 2nd ed. (Chicago, University of Chicago Press, 1965); and H. J. Morgenthau, *Politics Among Nations: The Struggle for Power and Peace*, 4th ed. (New York, Alfred A. Knopf, 1967). See also J. A. Kahl and J. M. Stycos, "The philosophy of demographic policy in Latin America", *Studies in Comparative International Development*, vol. I, No. 2 (1965), p. 1.

[19] J. Sawyer, "Dimensions of nations: size, wealth, and politics", *American Journal of Sociology*, vol. 73, No. 2 (September 1967), pp. 145-172.

terms, population size again assumes military importance.

15. Differentials in population size and rate of change, in conjunction with differences in levels and growth rates of technology and resources, impose a particularly volatile element on international relations.[20] In the margin, size is important, but it is primarily in cases where States have approximately equal resources and technological capabilities that absolute numbers make a critical difference.

Population dynamics, political instability and internal violence

16. The sources of internal instability and violence are numerous and varied. Several attempts have been made to identify empirically the factors that increase propensities for internal conflict.[21] Political scientists generally view the inability of a Government to meet demands as an important source of political unrest However, there is as yet no empirical evidence of a direct, statistically significant relationship between population variables and internal political instability The weight of the systematic and cross-national evidence is, in fact, contrary to any inference that population pressures, or density, or the rate of population growth have any direct bearing upon internal instability or domestic violence Many areas of the world that have a high population density, and many areas that are conventionally thought of as high-pressure regions, do not exhibit marked tendencies for political instability,[22] while many areas with roughly stable populations are quite unstable. Individual case studies where the relationship holds are not enough to prove a general law However, population variables do tend to be part of the conflict-generating dynamics in societies which already exhibit high stress and strain[23] and where population changes aggravate existing tendencies for internal conflict Since much of this evidence is based on a cross-national study of 84 contemporary countries for 1950-1960 and 1961-1965, the modest role of population variables in contributing to internal violence might be attributed to the time-frame in question, to the aggregation of countries at such a high level or to a focus upon cross-national analysis.[24] Closer, more detailed, regional or national analyses might shed further light on these findings, particularly in cases where *prima facie* evidence suggests possible linkages from population to internal violence The intervening linkages, however, are still to be determined.

17 On balance, therefore, the implications of population change for domestic instability and violence appear to be highly dependent upon the resources of a society and its ability to accommodate to new demands [illegible] greater demands upon its Government than one that is less so, with possibly destabilizing consequences.

Population distribution some consequences of density and pressure

18 Aside from simplistic inferences with regard to the connexion between concentration (internal density or pressure), on the one hand, and violence, on the other, the existing evidence again points more to inconsistencies of inference than to many sound conclusions Studies of animal behaviour suggest that drastic shifts within the social hierarchy in social habits and in patterns of interaction may result from increased density and/or pressure, and that conflict, aggression and overt violence are more prevalent under conditions of increased crowding Further, these studies show that the greater the density, the more likely it is that outward expansion will take place.[25] However, evidence from [illegible] ment require that any inferences be made with caution There are some arguments that high density with low resources and low technology is invariably destabilizing, but this has been challenged. Similar doubts exist concerning any direct link between population density and international violence.[27] None the less, in areas

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[20] For an extension of these arguments and specific examples, see N Choucri and R C. North, "Dynamics of international conflict· some policy implications of population, resources, and technology", *World Politics*, supplement, vol. XXIV (1972), pp. 80-121

[21] [illegible] *in Ar* *The* Studie versit *and* [illegible] studies of political instability and conflict behaviour, see R Tanter, "Dimensions of conflict behaviour within and between nations, 1958-60", *Journal of Conflict Resolution*, vol 10, No 1 (March 1966), pp 41-64 Many similar studies have been undertaken employing factor analysis as the basic methodology None focus upon population variables *per se*. Th[illegible]

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[24] *Ibid* For supporting evidence concerning the social preconditions for violence, see B Wedge, "The case study of student political violence: Brazil, 1964, and Dominican Republic, 1965", *World Politics*, vol. XXI, No 2 (January 1969), pp 183-206

[25] For a review of recent studies, see P M. Driver, "Toward [illegible] crowding on human task performance", *Journal of Applied Social Psychology*, vol 1, No 1 (1971), pp. 7-25

[27] S. Bremer, J. D Singer and U Luterbacher, "Crowding and combat in animal and human societies· the European nations, 1816-1965", unpublished manuscript, University of Michigan, November 1971

where populations place demands on their environments and where resources and technology are relatively unavailable, the propensities for conflict are certainly enhanced.

19. The elusive consideration of "felt" pressure has been raised by some scholars to explain the link between density (in spatial terms) or pressure (in terms of resources) and conflict behaviour. The arguments run as follows. In situations where the leadership or the politicized public perceives that pressures may be reduced through political action, this perception becomes critical in its own right, and empirical realities pale. Indeed, the social science literature abounds with debates about the importance of absolute deprivations, relative deprivations, rising expectations, lowered expectations and so forth, in terms of political implications and propensities for conflict and violence.[28] The relation of perceptions to realities is particularly elusive and there is no clear indication of the conditions under which felt pressures propel States towards conflictual behaviour in contrast to those situations in which actual pressures of numbers in relation to resources constitute the major determinants.

20. There is, however, some cross-national evidence which indicates that actual pressures are consistently related to both internal turmoil and measures of domestic rebellion and that pressure upon resources is positively related to internal conflict. Societies with high dependency ratios—large numbers of unproductive youth—are also the most unstable, but this relationship may, in large part, be spurious, both factors being positively correlated with economic development.[29]

21. In sum, although population density and population pressure do not appear to be direct contributors to violence at the international level, population pressure does emerge as one important determinant of internal violence. The evidence is still too general to allow for inferences with respect to any specific country, but broad patterns are discernible.[30]

Population movement: some consequences of migration

22. The political implications of population movement have been given comparatively little attention to date. Historically, conflict between populations has generally been over land resources and the redistribution of territorial rights. Hence, when the movement of population across national boundaries violates established views on rights and territoriality, migration becomes a variable of significant political importance. There are also political implications of movements from rural to urban areas, interurban migration and nomadic movements or migrations to the proverbial frontier;[31] but these have not been systematically examined.

23. The search for universally valid generalizations concerning the conditions and consequences of population movements has to date produced only marginal returns, as much of the data is situation-specific and time-bound, and there has been no effort systematically to compare the findings of diverse migration studies. However, this partial evidence does suggest that it is by changing the demographic profile of both host and source community that migration assumes political importance.[32] A lack of systematic data on who migrates, why and with what effect further hinders the clarification of these issues. The absence of a comprehensive theory of migration which takes into account the conditions of both the host community and the community of origin, the characteristics of the migrants and the alternative potential consequences, makes it difficult to evaluate the disparate evidence in more than general terms. In addition, the consequences of migration for the receiving community have been given greater attention than the consequences for the community of origin.

24. As the general tendency is for population movements to occur from less developed to more developed regions, an influx of less skilled, less affluent migrants into a community clearly can act to intensify demands for governmental services. This migration may occur both within a country and across national boundaries, and may be either temporary or permanent.

25. Rapid urban growth is a characteristic of countries experiencing turmoil and, specifically, of countries experiencing rebellion in Latin America, and countries with turmoil in Africa and Asia. A quantitative cross-national study indicates that it appears to have a moderately positive, although not statistically significant, correlation with measures of internal turmoil and rebellion.[33] These relationships are consistent, but they are not strong; nor is a causal relation established. The sheer number of newly urbanized people does not, in itself, contribute to the propensity for domestic violence. It is therefore important to look more closely at the evidence concerning the processes by which the movement of population to cities (as the major form of increased urbanization) results in political conflict.

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[28] See, for example, T. R. Gurr, "Urban disorder: perspectives from the comparative study of civil strife", *American Behavioural Scientist*, vol. II, No. 4 (March-April 1968).

[29] T. R. Gurr and H. Weil, *op. cit.*, pp. 17-20.

[30] There are many studies examining the economic implications of population pressures, but rarely are the political consequences rendered explicit. One study in Africa is particularly worthy of note: T. E. Dow, Jr., "Population pressure in tropical Africa", *Current History*, vol. 60 (March 1971), pp. 136-141. The author indicates the ways in which an area that has not commonly been viewed as having a population problem appears to have a very serious one indeed.

[31] For an excellent survey of internal migration, see D. J. Bogue, "Internal migration", in P. M. Hauser and O. D. Duncan, eds., *The Study of Population: An Inventory and Appraisal* (Chicago, University of Chicago Press, 1959), pp. 486-509; also W. Petersen, *op. cit.*; D. Fleming and B. Bailyn, eds., *The Intellectual Migration, Europe and America, 1930-1960* (Cambridge, Mass., Harvard University Press, 1969).

[32] See M. Weiner, *loc. cit.*, pp. 601-605. For problems of integrating migrants, see R. C. Hanson and O. G. Simmons, "Differential experience paths of rural migrants to the city", *American Behavioral Scientists*, vol. 13, No. 2 (September/October 1969), pp. 14-35.

[33] T. R. Gurr and H. Weil, *op. cit.*, pp. 18-19.

26. Political scientists who are concerned with urbanization have long believed that rapid movement to the cities results in economic frustration among the migrant population, that difficulties in adjusting to urban conditions lead to an increased awareness of the role of government and to radical politicization among the migrants, and that in the case of the urban poor, this politicization results in an opposition to the political system Urbanization theorists argue that such non-supportive attitudes tend to be translated into behaviour that results in political instability, but the validity of these theories is being increasingly questioned.[34]

27. Recent studies of population movement among the urban poor in Latin America suggest that the city is not necessarily a radicalizing influence; that there appear to be no differences among migrants and non-migrants on indexes of social conditions, political attitudes or behaviour patterns; and that there is no evidence that migrants in Latin America provide an invariable radical base from which political instability results.[35]

28. It also appears that the demands made upon Governments by the migrants tend to be for primary services and that these are not translated into broader social and economic demands for such things as education or employment opportunities [36] Political support for the régime by the migrants is thus best predicted by their access to these basic services. Delivering such services amounts to an important pre-condition for their absorption into the urban community. In addition, when migrants succeed economically in relation to the local population, an indigenous reaction may set in and the local population may employ political methods for opposing the migrants [37]

29 Urbanization as such tends to reinforce ethnic divisions and such divisions hinder the development of political participation and orderly political process. These divisions also result in the "fragmentation" of the social order by strengthening the differences between migrant and native.[38] It has also been suggested, however, that in the short run, the growth of cities dampens propensities for violence rather than increasing them. But this evidence is sketchy and time-bound

30. The political implications of international migration are more readily discernible, in that great cultural and political clashes have resulted from the large-scale movement of populations across national boundaries. Often, however, international migration results in violent conflict Countless examples of this phenomenon—most notably in the Middle East, South-East Asia and the South Asian subcontinent—point to the inherently destabilizing consequences of large-scale population movements [39] This situation is accentuated when political boundaries do not coincide with ethnic boundaries—as is often the case in many areas of the world.

31. So, too, many local conflicts can be attributed to gradual (but sometimes also drastic) changes in the composition and size of the population due to movements One study indicates a positive correlation exists between political violence and the percentage of refugees [40] Although there are no statistical analyses of these relationships, a series of case studies of small conflict indicates that migration (forced or otherwise) appears to be an important determinant of overt violence.[41]

Political implications of population composition

32 Population composition (age structure, socio-economic status, racial, ethnic and religious differences) often generates consequences with highly political implications, but, again, few attempts have been made to identify their separate effects. Although some scholars maintain that a youthful population provides some advantages in military terms which are not accorded to an older population, the composition of population by itself, as is the case for size, bears little upon over-all national power

33. Age structure is also conventionally regarded as a factor in generating internal conflict With due qualifications, the direct link is indeed substantiated The higher the proportion of youthful population, and the greater its unemployment, the greater are the probabilities of dissatisfaction, instability and violence A youthful population also places added strains upon the social services, while not contributing substantially to national production. There is circumstantial evidence

[34] See, for example, W. Kornhauser, *The Politics of Mass Society* (New York, The Free Press, 1959); and a review of relevant literature as presented in W. A Cornelius, "Urbanization as an agent in Latin American political instability, the case of Mexico", *American Political Science Review*, vol. LXIII, No 3 (September 1969), pp 833-857.

[35] See, for example, W A Cornelius, *loc cit*, T. R. Gurr and H Weil, *op cit*, and J. N Nelson, *Migrants, Urban Poverty and Instability in Developing Nations*, Center for International
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arena of political learning the impact of residential context upon political attitudes and behavior among the migrant poor in Latin American cities", paper prepared for the Annual Meeting of the American Political Science Association, September 1972

[37] M Weiner, "When migrants succeed and natives fail", paper prepared for the General Congress of the International Union for the Scientific Study of Population, 27 August - 1 September 1973, Liège, Belgium

[38] A E Goodman, "The political implications of urban development in Southeast Asia· the 'fragment' hypothesis", *Economic Development and Cultural Change*, vol 20, No. 1 (October 1971), pp 117-130

[39] For a general statement, see C P Kindleberger, "Mass migration, then and now", *Foreign Affairs*, vol 43, No 4 (July 1965), pp 644-658 One of many more detailed national analyses is found in S J Burki, "Social and economic determinants of political violence a case study of the Punjab", *Middle East Journal*, vol 25, No 4 (Autumn 1971), pp 465-480 See also M Weiner, "Political demography: an inquiry into the political consequences of population change", *loc. cit.*

[40] S J. Burki, *loc cit*, 1971.

[41] N Choucri, "Population dynamics and local conflict: a cross-national analysis of population and war", Massachusetts Institute of Technology, Center for Interna al Studie 3.

which indicates that a youthful population amounts to a contributing factor in many political and revolutionary movements.

34. A high proportion of youths in a population may tend to strain the mechanisms for socialization in societies, particularly when resources are inadequate to cope with large numbers being inducted into the social order, resulting in alienation which may become transformed into active opposition to the political system. There are some long time-delays involved, but strains may accumulate in society which contribute to eventual systemic change or over-all institutional transformations (again, the intervening sequence is difficult to establish).

35. It is commonly asserted that the more homogeneous a society is, the more stable it is likely to be, and the greater its capacities are for collective action. Political analysts tend to agree that political instability and violence are more likely to occur in situations where the cleavages in a society are reinforcing rather than cross-cutting: for example, where religious differences coincide with ethnic divisions, the propensities for political instability and violence are greater than when these characteristics are more randomly distributed. [42] The studies on migration mentioned above tend to reinforce these inferences and there are numerous illustrations of such situations. For example, students of Indian politics have long argued that one of the reasons for the seeming stability of the democratic process in India is that the lines of cleavage in society are cross-cutting. In Pakistan, by contrast, socio-economic and political cleavages were mutually reinforcing, thus contributing to the intensification of hostilities and eventually to violence.

36. Population composition may also provide important constraints upon which the political order is shaped. [43] The act of census-taking assumes political proportions where the political order is based upon recognized cleavages in the society and where any significant changes in relative populations might result in demands for similar adjustment in the political process. The case of Lebanon, where the census amounts to a major political issue, is illustrative of such considerations.

37. A recent study of the political implications of population composition in South Asia notes that the complex and asymmetrical character of the ethnic map of the area holds important consequences for war and peace. Each State in South Asia contains a number of ethnic groups which, in general, have a high cultural and political consciousness. Often, these ethnic divisions do not coincide with the political boundaries and the resulting strategic considerations become important parameters for conflict in the area. [44] The manipulation of ethnic groups for political purposes is not uncommon in this area—or in other parts of the world—but there exists as yet no comprehensive study of the alternative political implications of ethnic divisions in conflict situations. Beyond these generalizations, however, there is little evidence concerning the precise political implications of population composition. To date, the overwhelming focus has been on the implications of numbers—their composition or their distribution still remains relatively unexamined.

[42] See T. R. Gurr and H. Weil, *op. cit.*, pp. 18-21.

[43] For one illustration of the political implications of a heterogeneous population in terms of "in group-out group" propositions, see P. C. W. Gutkind, "Accommodation and conflict in an African pre-urban area", *Anthropologica*, vol. IV, No. 1 (1962), pp. 164-173. There are many such studies.

From population to war: towards some causal linkages [45]

38. Although it is frequently argued that rapid population growth is a major cause of international instability and violence, the simple proposition that increased population results in international violence cannot be seriously entertained. From the available evidence it must be inferred that population dynamics do not appear to be direct causes of violent conflict either within or between countries. [46] The critical elements in any population/violence calculus might involve less population variables *per se* than the ways in which population combines with other factors to produce conflict. What those factors are and the way in which they interrelate constitute an area of inquiry which remains to be clarified.

39. In this context, the population variable must be viewed in three ways: as a parameter of a conflict situation, in the sense that it amounts to one of the characteristics which defines the antagonists; as a variable, in that changes in population produce commensurate (or disproportionate—as the case may be) changes in the situation at hand; or as a multiplier, in the sense that population characteristics may intensify existing cleavages and problems and render a situation less tolerable than might otherwise be the case. For purposes of analytical clarity, it is important to distinguish among these roles which population variables may assume.

40. A dynamic process linking population to war can be abstracted from the classical works on war and from recent empirical analyses. [47] First, there are internal consequences of added population—pressures on resources, dissatisfactions, unrest, lowered levels of living, relative deprivations and so forth. Secondly, there are the factors which allow internal dissatis-

[44] W. Conor, "Ethnology and the peace of South Asia", *World Politics*, vol. 22 (Spring 1969), pp. 51-86.

[45] This section is adapted from the author's previous research.

[46] See A. Wright, *op. cit.*, S. Bremer, J. D. Singer and U. Luterbacher, *op. cit.*; the essays in B. Russett, ed., *Peace, War, and Numbers* (Beverly Hills, California, Sage Publications, 1972); P. Renouvin and J. B. Duroselle, *Introduction to the History of International Relations* (New York, Frederick A. Praeger, 1967); for a central review, see N. Choucri, *op. cit.*

[47] These observations are based on N. Choucri, *op. cit.*, pp. 135-140.

factions to be translated into behavioural terms. These factors can be thought of as facilitators in terms of technological capability, military effectiveness, manpower, labour and so forth. Thirdly, there are those processes which relate States to each other and initiate dynamics that assume international characteristics. Such processes would be commercial rivalries, expansions, conquests and the like. Fourthly, there are factors which involve a comparative calculus on the part of at [illegible]

international dynamics in conjunction with external relations, such as changes in power relations, redistributions of capabilities, changes in international alignments and the like. Sixthly, there are the explicit implications for conflict of these factors, in terms of provocation of one party by another, overt conflict and then armed violence.

41. In sum, population effects are mediated through a series of intervening linkages, and the initial conditions embedding population in the internal demographic, economic and political profile of a country become an important set of variables in this complex process.[48]

42. To these empirical realities must be added the perceptual factors which place a great element of uncertainty in this calculus. Perceptions of pressures, of differentials, of competitions, of change in the balance of power and so forth might not be congruent with actual situations. Feelings may assume a reality [illegible]

graphic considerations enter the military and strategic calculus of countries

43. Reversing the causal sequence, some studies have been concerned with the effects of population upon the termination of war. An analysis of several wars indicated no evidence to support the general hypothesis of a fixed relationship between average casualties lost in battle and total population losses in wars, however, countries tend to try to surrender before they suffer population losses from about 3 to 6 per cent [49] Population thus amounts to an ultimate constraint upon national behaviour and the conduct of war.[50] Population variables are therefore important in defining the parameters of permissible behaviour—what can and cannot be done in different circumstances—and these parameters are shaped as much by demographic conditions as by resource and technological conditions.[51] The greatest instabilities and propensities for war are to be found in situations where population pressures (or density, or over-population in relation to [illegible]

overt conflict and violence.

CONCLUSION: SOME POLITICAL CONSEQUENCES OF POPULATION DYNAMICS

44. The foregoing observations have pointed to some evidence—sometimes contradictory and always partial—concerning the relationship between population and politics Several conclusions emerge:

(*a*) The political implications of population variables in any situation depend upon the resources of a society and its level of technology, knowledge and skills Different populations make different demands upon their environment with differing consequences,[52]

(*b*) Rapid population growth invariably places added loads upon governmental capabilities and upon services performed and increases the cost of governance;

(*c*) Population pressures tend to intensify existing strains and stresses in society Although there appears to be some direct relationship between population change and political instability, neither urbanization alone, nor crowding in cities, necessarily increases propensities for violence;

(*d*) Population composition often shapes the nature of the political process if the distribution of political privileges, rights and obligations is done according to attributable criteria, such as religion, race or ethnic group;

(*e*) A youthful population tends to strain the socialization mechanisms in society, particularly when resources are inadequate to cope with large numbers being inducted into the social order, often resulting in domestic conflict;

(*f*) [illegible]

an ultimate factor in the ability to wage war;

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[48] A quantitative study of the origins of the First World War [illegible] tions [illegible] *Popu*[illegible]

[49] [illegible] battle [illegible] *Reso*[illegible]

[50] [illegible] S Ro[illegible] ed., *op. cit.*, pp. [illegible]

[51] See N. Choucri, "In search of peace systems Scandinavia and the Netherlands: 1870-1970", in B Russett, *op. cit.*, pp 239-274; and, for related evidence, R J Rummel, "U.S [illegible] a technological perspective", *Bioscience*, vol 19, No. 1065 (December 1965), pp 1065-1072, A L. Austin and J. W. Brewer, "World population growth and related technical problems", Institute for Electrical Engineering, *SPECTRUM*, December 1970, pp. 43-54.

(*g*) Internal migration does not necessarily lead to overt violence. By contrast, many international conflicts can be attributed to population movements across national boundaries;

(*h*) In some cases, population variables provide the roots of conflict; in others, they provide the context within which ongoing conflicts become routinized or take on new dimensions. Without explicit recognition of the demographic basis of a political conflict, imposed solutions may be of short duration.

Policy questions and recommendations for research

45. In view of the inadequacies of the work undertaken to date, future research on population, politics and public policy should try to meet the following criteria: first, such research should be cross-national; secondly, it ought to be conducted over time, adopting a longitudinal perspective; thirdly, it must be scientific, that is, capable of falsification, replication and meeting acknowledged tenets of social science inquiry; fourthly, such research must be policy relevant, by identifying the manipulables in the social order, the costs of manipulation and the tools for implementing public policies; fifthly, it must be data-based, drawing upon existing files and developing novel observations when the required data are not available; and sixthly, the results must be communicable and amenable to evaluation and critical assessment.

46. Among the substantive issues to be examined in concerted and systematic fashion are the following:

(*a*) An assessment of cost of added population in terms of actual loads upon governmental capabilities and social services;

(*b*) An identification of the intervening factors, processes or sequences between population variables and negative social and political consequences, such as crime, conflict, violence and social disruption;

(*c*) A systematic monitoring of migratory trends in terms of who migrates, why, where and with what consequences upon the place of origin and the place of destination;

(*d*) A clarification of the process by which population movement takes place, in terms of opportunities, pressures or restrictions;

(*e*) An evaluation in cross-national context of the ways in which societies at different levels of socio-economic development are affected by added population;

(*f*) An identification of the different social policies which (implicitly or explicitly) affect population characteristics in different societies and an evaluation of potential inconsistencies among such policies;

(*g*) An assessment of the political and administrative requirements for the development of effective means of influencing the population characteristics in different societies;[53]

(*h*) An evaluation of the effects of population variables upon political development;

(*i*) An identification of the effects of alternative population policies upon different sectors of society;

(*j*) A clarification of the types of systematic data and information needed to determine the extent to which different societies would be receptive to governmental policies designed explicitly to effect population characteristics.

47. Some critical imperatives for research purposes include long- and short-range studies and studies that reveal the long-run implications of decisions made in the short run.[54] Simple projective techniques are no longer adequate for the analysis of complex social systems.

48. Some of these questions can best be undertaken by the United Nations, and others by governmental or private institutions. In terms of the criteria cited above, the United Nations is best suited to engage in investigations that assume a global perspective, draw upon United Nations data files and are policy relevant by having direct bearing upon international policies towards population. Co-operation among national and international institutions is essential in the area of data collection and compilation and in the assessment of the results of research.

49. Another set of important data, which international organizations may provide, pertains to the ways in which Governments and national leaders perceive the demographic situation in their countries, their assessment of their own problems and their perspectives upon alternative approaches. A similarly critical consideration involves determining the degree of congruence between perceptions of the situation and the actual situation—as reflected in population trends and population structure. A third imperative involves an assessment of the extent to which existing national institutions and international agencies are appropriate for responding to problems generated by population trends.

50. The most important role for international organizations in this regard pertains to their clearing-house function. Translating scientific research results into an operational context amounts to a major challenge, a task that research groups in international organizations can serve better than any national or trans-national institution.

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[53] For a general survey, see R. Elliott and others, "U.S. population growth and family planning: a review of the literature", in D. Callahan, ed., *The American Population Debate* (Garden City, N.Y., Doubleday Anchor Books, 1971), pp. 186-226. See also M. Stamper, *Population Policy in Development Planning: A Study of Seventy Less Developed Countries*, Reports on Population/Family Planning, No. 13 (New York, The Population Council, 1973); R. J. Lapham and W. P. Mauldin, "National family planning programs: review and evaluation", *Studies in Family Planning*, vol. 3, No. 3 (March 1972).

[54] There are, to date, almost no systematic attempts to evaluate the adaptive and problem-solving capabilities of political systems. *This is an area in which research is needed* over and above the orthodox literature in comparative politics as exemplified by Almond and Powell, *Comparative Politics: A Developmental Approach* (Boston, Little, Brown, 1966).

LAW AND WORLD POPULATION

United Nations Fund for Population Activities

1. Recognizing the important role which law plays in the population field, the United Nations Fund for Population Activities (UNFPA) has sponsored since 1971:

> "a major study of law and population designed to clarify the impact of certain laws on population trends and to identify inconsistencies between existing legislation and government policy with regard to population. The research is intended to provide the basis for the development of guidelines for the revision and adaptation of legislation as required in support of population action programmes in the countries concerned." [1]

2. The significance of the project to the Fund may be seen from the fact that it is the first project directly executed by the Fund rather than through the United Nations system of agencies. As such, the project is conducted not merely as "an academic study, but as a dynamic project which will have long-felt effects on the behaviour of countries that respect the 'rule of law'" [2] Accordingly, the Fund "would like to see the population factor formulated into policies and executed as operationally feasible programmes *in all countries if possible*". [3] Members of the project staff were urged to take part meaningfully in the preparations at the national level for the World Population Conference and to make available their studies and findings for consideration by the time of the Conference. To this end, the Fund sponsored a Symposium on Law and Population on 26-31 May 1974 to serve as a "follow-up" to the study. [4] Jurists, social scientists and public health officials concerned with population laws throughout the world had an opportunity to exchange views and experiences and to explore the existence of common features in their countries' legal systems related to population In this light, it was considered that the Symposium might adopt recommendations of interest to the World Population Conference.

3. It is the purpose of this paper to show what population law is, why it is important to world population, and how it can contribute to the solution of the population problem.

POPULATION LAW AND ITS HISTORY

4. "Population law" may be defined as that body of the law which relates directly or indirectly to the population growth, distribution and those aspects of well-being affecting, as well as affected by, population size and distribution By "law" is meant the constitutional, statutory, administrative and decisional, as well as the customary "Law", as used in this paper, embraces more than the governmental decisions or programmes that are "put into official form and translated into action" [5] The relevancy of customary law is succinctly described by Ehrlich· "At the present as well as at any other time, the center of gravity of legal development lies not in legislation, nor in juridical science, nor in judicial science, but in society itself" Again, he cautioned· "To embrace the whole variegated body of human activities in Legal Provisions is about as sensible as trying to catch a stream and hold it in a pond; the part that may be caught is no longer a living stream but a stagnant pool—and a great deal cannot be caught at all." [6]

5. Not only does population law appear in different forms, but it covers many fields Thus, in addition to laws directly concerned with fertility (contraception, sterilization and abortion), there are many more laws indirectly affecting fertility: obscenity; marriage age; polygamy; extended family; child allowances; old-age security; employment of women; child labour; housing; education (both general and sex education); medical practice; customs; taxes; migration; land tenure and inheritance.

6. Just as the impact of law upon the behaviour of the people varies from country to country and according to the subject-matter, the categories of law that have significant bearing on population growth, distribution and well-being also vary from country to country. Take inheritance law, for example. [illegible] the Hindu Succession Act of 1956, which [illegible]

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[1] [illegible]

Policy and Organization, Proceedings of the Second Annual Meeting of the International Advisory Committee on Population and Law, Tokyo, 30-31 October 1972, published by the Law and Population Programme of the Fletcher School of Law and Diplomacy and administered with the co-operation of Harvard University (Medford, Massachusetts, Tufts University, 1973), p. 22.

[3] *Ibid*. Emphasis supplied

[4] UNFPA, *op. cit*

[5] A. Larson, "Introduction", in [illegible] and [illegible] *Population and Law* (Leiden, A W Sijthoff and [illegible] N C, Rule of Law Press, 1971) [illegible]

[6] E Ehrlich, "The sociology of [illegible] vol 36 (1922), pp 130 and 13[illegible]

and female heirs on equal footing,[7] the continued dominance of customary law in limiting succession to males only has exerted a pro-natalist effect. A family that already has several daughters will continue to want more children in the hope of producing a son, in order to keep property within the family. On the other hand, in countries where succession is, in fact, shared equally by sons and daughters, inheritance law would not loom large in population matters. For India, therefore, both the statutory and customary laws on inheritance need to be compiled and studied.

7. Since the population problem is multidimensional and the co-ordination of many fields is involved—a process which has heretofore been hampered by strict compartmentalization—*the population problem can no* longer be viewed solely as one of numbers or of census-taking, nor can the provision of contraceptives and family planning services be regarded as the sole solution of the population problem. (Even if the population problem should be reduced to one of over-population, which could be alleviated by contraceptives and family planning services, the creation of an effective demand is equally important.) Merely decreasing the rate of population growth is only one aspect of the problems associated with population.

8. Because of his training in the consideration of all sides of a problem, a lawyer can render invaluable services in the population field through the use and co-ordination of all branches of the law. So long as "law is an instrument of social policy",[8] its potential as catalyst for social reform should be fully realized.[9]

9. From earliest times the law has been pro-natalist. The early codes dating back to Hammurabi and the Emperor Augustus already contained such provisions. Thomas Jefferson, in his draft for the Declaration of Independence, accused King George III as follows:

> "[He] has endeavored to prevent the population of these states; for that purpose obstructing the laws for naturalization of foreigners; refusing to pass others to encourage their migrations hither; and raising the conditions of new appropriations of lands."

Jefferson's draft was, in fact, incorporated into the final text of the Declaration.[10] These facts show the significance of population law in human history and it is noteworthy that, through almost all of this period, population growth has been regarded as desirable *per se*.

10. The conscious relating of law to population in the sense of emphasizing other than the mere favouring of growth is of comparatively recent origin. It has only been since the Second World War that the desirability of growth has been questioned and that human rights and other considerations have entered the population picture.

11. Among the changing factors, the following may be mentioned:

(*a*) The precipitous fall of the death rate, particularly in the developing countries, together with the dramatic increase in the rate of population growth and with the growing realization on the part of most responsible people that this is occurring;

(*b*) The spread in the general understanding of the danger both to mothers and to children caused by malnutrition and the health hazard faced by large families in developing countries;

(*c*) The revolutionary change in the position of women in almost all developed countries, and increasingly in the developing countries, where women are gaining equality not only in political and economic life, but in domestic and sexual life, with the corollary that women should be free to decide for themselves whether or not to bear children;

(*d*) The increasing recognition of problems of unwanted children, including emotional disturbance, relationship to juvenile delinquency and their consequences upon the family and society;

(*e*) The widespread illegal abortions and the growing realization that contraception is preferable to abortion;

(*f*) The changing attitude towards morality and sex, with greater willingness to discuss openly such matters as contraception, voluntary sterilization, abortion and sex education;

(*g*) The development of new and more reliable contraceptives, such as the intra-uterine device (IUD) and the pills, and the relatively safe abortion operations;

(*h*) The concept of responsible parenthood, which has been accepted by all religions and ideologies;

(*i*) The emphasis through United Nations declarations, proclamations and conventions upon the various human rights principles, including that of family planning as a basic human right;

(*j*) The attainment of independence and self-determination by most countries, thus enabling them to review and reform their laws in light of their own needs and the human rights principles.

12. Despite these changes, only a low priority has been accorded to law compilation and reform, and population laws in most countries continue to reflect the prevailing values of earlier generations. In some countries, they still reflect the "legal imperialism" of the former colonial Powers, despite the advent of political independence and self-determination and despite the fact that even some of the former colonial Powers have already changed their own laws because of their incompatibility with human rights. Only in a few coun-

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[7] Act No. XXX of 1956; Saran Gurdev Singh, "India", in L. T. Lee and A. Larson, *op. cit.*, p. 119.

[8] E. M. Vorozheikin, "Population and the law", in *USSR—Papers on Population* (Moscow, 1973), p. 89.

[9] L. T. Lee, "Law and family planning", *Studies in Family Planning* (April 1971), p. 82 (originally a background paper prepared for the World Health Organization Expert Committee on Family Planning in Health Services, 24-30 November 1970).

[10] Cited in C. Means, "The constitutional aspects of a national population policy", *Villanova Law Review*, vol. 15 (1970), p. 785.

tries has the law been changed so as to deal with contemporary social and economic conditions.

13. Lawyers themselves are partially to blame for this state of affairs. Directing themselves to the technical aspects of the law, both in their training and in their practice, they have, with but a few exceptions, been inactive regarding the challenge of the new problem. Moreover, being conservative as a profession, they have tended to avoid fields which, like population, are regarded as politically sensitive In 1965, out of some 1,000 participants and observers at the United Nations World Population Conference at Belgrade, there was only one lawyer, and none of the hundreds of papers presented at the Conference dealt with the legal aspects of the population problem and family planning.

POPULATION AND HUMAN RIGHTS

14. While responding to the immediate challenges posed by the population problem, Population Law is concerned ultimately with human rights. Family planning, for example, should not be viewed as a goal in itself, but rather as a means to an end—opportunities for adequate food, health, clothing, shelter, education, work, recreation, old-age security etc—all of them basic human rights which family planning effects

15. Since 1966, four major events have lent particular urgency to the study of Population Law. the Declaration on Population by 12 Heads of State in 1966 (increased to 30 in 1967) that family planning is a basic human right,[11] the unanimous adoption in 1968 by the United Nations Conference on Human Rights of the Teheran Proclamation that family planning is a basic human right, and of a resolution that couples also have the right to be sufficiently instructed and informed on family planning;[12] the General Assembly Declaration on Social Progress and Development in 1969, containing a provision that the right to family planning includes not only the "knowledge", but also the "means necessary" for the exercise of this right;[13] and the unanimous agreement at the United Nations Symposium on Population and Human Rights held on 21-29 January 1974 in Amsterdam that among the essential elements of population assistance programmes offered to Governments by international organizations would be the compilation, review and reforms of their laws *in the light of both population policy and human rights.*[14]

Status of human rights

16 The question may be raised concerning the status of human rights, whether human rights are imbued with a legal quality thus imposing legal responsibility upon States, or whether these are merely moral rights—hortatory in nature, but not legally binding. Since the role of the lawyer in population matters hinges very much upon the answer to this question, it is necessary to discuss this in some detail.

17. The status of human rights has traditionally been linked to the types of instruments into which they are incorporated. Thus, the answer to the question whether human rights are legally or only morally binding upon States usually hinges upon the fulfilment or nonfulfilment of the various requirements under the law of treaties. As is often the case, where human rights are dealt with in such instruments as declarations,[15] proclamations,[16] or unratified covenants,[17] they are considered morally, but not legally, binding. Only duly ratified conventions[18] are given legally binding effect and then only on the countries which ratified them. This treaty-oriented approach to human rights has been subscribed to by many jurists.[19]

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[11] United Nations, *Population Newsletter* (April 1968), p. 44

[12] For texts of the Teheran Proclamation on Human Rights and resolutions, see *Final Act of the International Conference on Human Rights* (United Nations publication, Sales No E 68.XIV 2)

[13] Proclaimed by the General Assembly of the United Nations in resolution 2542 (XXIV) of 11 December 1969, annex, article 226

[14] E/CONF 60/CBP/4, para 150 (g)

[15] *A/CONF 32/6*, para 365, and *A/CONF 32/6/Add 1*, para 12, list the following "Declarations" on human rights adopted by the General Assembly up to and including 1967·

[illegible]

Declaration on the Elimination of Discrimination against Women (1967)

A "Declaration" may be codified into a Convention which enters into force upon receiving a requisite number of rati- [illegible]

the requisite number of ratifications to enter into force, as in the case of the Universal Declaration of Human Rights, General Assembly resolution 217 A (III) of 10 December 1948, which was codified into two International Covenants in 1966 (see foot-note 17 below), but has not at the time of writing entered into force A declaration may also stand alone, unaccompanied by codification, as is the case with the great [illegible]

multilateral agreements under United Nations auspices, see [illegible]

1948), the Supplementary Convention on the Abolition of Slavery, the Slave Trade and Institutions and Practices Similar to Slavery, United Nations, *Treaty Series*, vol 266; and the [illegible] Traffic in Persons and [illegible] of Others, General [illegible]

[illegible] *Law* (New York, [illegible] "The in [illegible] of [illegible]

18. It is submitted, however, that human rights, to the extent that they have met the conditions prescribed below, are, *ipso facto*, legally binding upon States, regardless of the existence of a duly ratified treaty, for human rights, by definition, are "rights which attach to all human beings equally, whatever their nationality".[20] As such, the legal validity of their application cannot be rooted solely in a mere piece of paper signed and ratified by States.

19. By emphasizing the formal or procedural aspects of human rights treaties, the traditional approach appears to confuse the instruments stipulating human rights with the substantive human rights themselves. Rather, the analysis of the binding force of human rights must be approached also from their non-treaty sources: natural law; customary international law; and general principles of law as recognized by civilized countries. Each of these sources has contributed to the development of human rights. These sources of human rights are briefly discussed with special emphasis on the formation of customary international law in the light of developments in the twentieth century.

Natural law

20. Whether in their manifestation as "inherent rights", "fundamental freedoms", or "natural justice", human rights are synonymous with the law of nature. Except for those extreme positivists who would deny *in toto* the existence of natural law,[21] the latter is deemed to underlie both domestic legislation and international agreements, finding expression in such basic instruments as the Charter of the United Nations[22] and national constitutions.[23] Yet, even for these positivists, to the extent that human right-natural law has already been incorporated into these basic laws, it is already binding upon States regardless, or even in spite of, a treaty.

Customary international law

21. The recent trend of codifying customary rules of international law into conventional international law[24] is reflected in recent attempts at codifying human rights into treaty form.[25] It should be noted, however, that in the absence of a binding treaty, the validity of international custom as the second source of international law in the criteria of the International Court of Justice[26] remains undiminished. Thus, those human rights based on international custom continue to be binding upon States, notwithstanding the latter's failure to ratify or adhere to such treaties.

22. The importance of custom-based human rights assumes growing proportions in light of the increasingly active involvement of the United Nations in the field of human rights.[27] That the United Nations has clear authority to discuss and make recommendations on human rights matters is specifically provided for in Articles 10, 13, 55 and 62 of the Charter. While it is not contended that all General Assembly resolutions have a legally binding effect upon Members of the United Nations, those resolutions which are declaratory of customary international law cannot detract from the pre-existing law, and through incorporation of that law may be cited as if they themselves have legally binding effect.[28] In addition, it is submitted that repeated and near-unanimous resolutions or declarations may achieve such an effect through accelerating the custom-generating process. Judge Tanaka describes well the working of such process:

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the Universal Declaration of Human Rights on international and national law", *American Society of International Law Proceedings* (New York, 1959), pp. 217-229; P. N. Drost, *Human Rights as Legal Rights: the Realization of Individual Human Rights in Positive International Law; General Discussion and Tentative Suggestions on an International System of Human Rights* (Leiden, Sijthoff, 1951), p. 32.

[20] Sir Humphrey Waldock, "Human rights in contemporary international law and the significance of the European convention", *International and Comparative Law Quarterly*, Supp. publication, No. 11 (1965), p. 3. Sir Humphrey Waldock went on record as stating that the constant and widespread recognition of the principles of the Universal Declaration of Human Rights "clothes it, in my opinion, in the character of customary law". *Idem.*, p. 15.

[21] See, for example, H. Kelsen, "The pure theory of law", *Law Quarterly Review*, vol. 51 (1935), p. 517; H. Kelsen, "The pure theory of law and analytical jurisprudence", *Harvard Law Review*, vol. 55 (1941), p. 44; H. Kelsen, *General Theory of Law and State*, translated by A. Wedberg (1949); H. Lauterpacht, *Modern Theories of Law* (1938), pp. 105-138; W. Ebenstein, *The Pure Theory of Law* (1945).

[22] Thus, the Charter of the United Nations makes seven references to human rights in addition to using such terms as "fundamental freedoms" and "inherent rights". An example of the latter provides that "nothing in the present Charter shall impair the *inherent right* of individual or collective self-defence". (Article 51, emphasis supplied.) The basic nature of the Charter is evidenced in Article 103, under which obligations under the Charter shall prevail over those demanded by any other international agreement, past or future.

[23] See, for example, United States of America, *Constitution*, amendments I-X, especially the due process clauses. See also the American Declaration of Independence of 1776, which contains the renowned passage: "We hold these truths to be self-evident, that all Men are created equal, that they are endowed by their Creator with certain *unalienable Rights*, that among these are Life, Liberty and the pursuit of Happiness". (Emphasis supplied.)

[24] L. T. Lee, "International Law Commission re-examined", *American Journal of International Law*, vol. 59 (1965), pp. 545-546.

[25] Examples of this practice are the codification of the Universal Declaration of Human Rights into the 1966 International Covenants on Economic, Social and Cultural Rights and on Civil and Political Rights, and the codification of the United Nations Declaration on the Elimination of All Forms of Racial Discrimination into the International Convention on the Elimination of All Forms of Racial Discrimination.

[26] Statute of the International Court of Justice, Art. 38, para. 1.

[27] For an excellent review of United Nations activity in the field of human rights, see J. Carey, *United Nations Protection of Civil and Political Rights* (Syracuse, N.Y., Syracuse University Press, 1970).

[28] Thus, Tunkin refers to the 1960 Declaration on the Granting of Independence to Colonial Countries and Peoples as declaratory of customary international law. Operative paragraph 7 of the Declaration provides that "all States shall observe faithfully and strictly the provisions of the Charter of the United Nations, the Universal Declaration of Human Rights and the present Declaration . . .". See G. I. Tunkin, *Droit International Public: Problèmes Théoriques* (1965), p. 100 ff.; J. P. Humphrey, "Human rights and world law", working paper presented at the World Conference on World Peace Through Law, Abidjan, Ivory Coast, 26-31 August 1973.

"According to traditional international law, a general practice is the result of the repetition of individual acts of States constituting consensus in regard to a certain content of a rule of law. Such repetition of acts is an historical process extending over a long period of time ... The appearance of organizations such as the League of Nations and the United Nations, with their agencies and affiliated institutions, replacing an important part of the traditional individualistic method of international negotiation by the method of 'parliamentary diplomacy' ... is bound to influence the mode of generation of customary international law. A State, instead of pronouncing its view to a few States directly concerned, has the opportunity, through the medium of an organization, to declare its position to all members of the organization and to know immediately their reaction on the same matter In former days, practice, repetition and *opinion juris sive necessitatis*, which are the ingredients of customary law might be combined together in a very long and slow process extending over centuries. In the contemporary age of highly developed techniques of communication and information, the formation of a custom through the medium of international organization is greatly facilitated and accelerated, the establishment of such a custom would require no more than one generation or even far less than that This is one of the examples of the transformation of law inevitably produced by change in the social substratum."[29]

23 The question of when the recommendation in a General Assembly resolution is transformed into a legally binding prescription would hinge upon the intent of the resolution, the extent of the consensus supporting it and the repeated endorsements it receives both in and out of the United Nations. Once completed, the metamorphosis would endow the General Assembly resolution with customary law obligations for States Members which would be as binding as if incorporated in a ratified treaty.[30]

24. As J. P. Humphrey noted:

"What is required is consensus. Time is not an essential element. There have, indeed, been some recent examples—for example, in the matter of the continental shelf and air space—of customary rules which have come into being almost instantly; instant custom, if you will."[31]

25. Constantin A Stavropoulos also aptly stated:

"The effect of a resolution may vary from case to case and even from State to State, but it seems undue conservatism to suggest that Assembly resolutions have not, in fact, become one of the principal means whereby international law is now moulded, especially in those instances ... [as with] the Universal Declaration of Human Rights of 10 December 1948 ... where the resolution has enjoyed the support of virtually all States Members, both at the time of its adoption and subsequently."[32]

General principles of law

26 Certain rights may be inferred from express rights by reasoning or applying by analogy the general principles of law—the third source of international law in the World Court's criteria[33] Such inferred rights may in time ripen into express rights through the United Nations custom-generating process Thus, although the right to family planning was not explicitly included in the Universal Declaration of Human Rights or the two 1966 International Covenants on Economic, Social and Cultural Rights and on Civil and Political Rights, such a right may be inferred from the rights to equality of the sexes, privacy, conscience, work, adequate standard of living, health and well-being (physical, mental and environmental), education (including that for the full development of the human personality) and freedom from hunger[34] The right to family planning was subsequently incorporated in the Teheran Proclamation on Human Rights[35] and the United Nations Declaration on Social Progress and Development[36] Likewise,

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[illegible]

going into the merits of the issue, however, the Court dismissed the case on procedural grounds in that the applicant States failed to establish a "legal right or interest" in the subject-matter Judge Tanaka dissented from the Court's holding on "legal right or interest" and proceeded to consider the question whether "resolutions and declarations of international organs can be recognized as a factor in the custom generating process"

[30] D. C. [illegible]

[31] J P [illegible]

[32] *C A* [illegible] *ment of* [illegible] Nations d[illegible] statement [illegible] session of [illegible] tinguished [illegible] and pervasive international acceptance of the Declaration allows us to state that it has become, or at least is becoming, international law." Address before the United Nations Association of the United States in New York, 10 November 1970

[33] See foot-note 26 given above Commenting on Oppenheim's interpretation of Article 38 (1) (c) as authorizing "the Court to apply the general principles of municipal jurisprudence, in particular of private law" (*International Law*, 8th ed (1967), vol I, p 29), Brownlie stated "What has happened is that international tribunals have employed elements of *legal reasoning* and private law analogies in order to make the law of nations a viable system for application in a judicial process" Brownlie, *Principles of Public International Law* (Oxford, Clarendon Press, 1966), p 13 (emphasis supplied) See also W Friedman, "The uses of 'general principles' in the development of international law", *American Journal of International Law* (1963), pp 279 and 287, H Lauterpacht, *Private Law Sources and Analogies of International Law* (London, Longmans, Green and Co., 1927)

[34] L. T Lee, "The unique role of UNESCO in promoting the teaching, study, dissemination and wider appreciation of international law" (SEM/LAW (67) 6), background paper prepared for the United States National Commission for UNESCO, p 15

[35] See foot-note 16, para 16 and resolution XVIII of that Conference, entitled "Human rights aspects of family planning".

[36] General Assembly resolution 2436 (XXIII).

although the right to freedom from hunger was not specifically included in the Universal Declaration of Human Rights, it was later stipulated in the International Covenant on Economic, Social and Cultural Rights.[37]

27. In several countries, the right of privacy has recently been interpreted to include the right to use[38] or import[39] contraceptives or even to have abortion upon request during the first trimester of pregnancy.[40] Since these newly discovered derivative rights are based upon a more fundamental, pre-existing right, their legal quality must be considered as having originated contemporaneously with that of the parent right.

28. It is submitted that whether a right is "expressed" or "inferred", its legal validity remains the same. Thus, not all population laws need be explicitly categorized as part of natural law, customary international law or as human rights before partaking of their legal character.

29. Based on the foregoing discussion, the traditional treaty approach to human rights must be considered too restrictive. Once a right has been accepted with the requisite consensus, whether or not expressly set out in a formal treaty, it is automatically a legal right and carries with it all the implications of that status.

Doctrine of estoppel

30. Even assuming a failure on the part of a country to accord full legal status to human rights, that country's vote on a General Assembly resolution or a human rights declaration must be taken as reflecting its official opinion with all the implications that go with it. As Humphrey propounded:

> "How, indeed, could that opinion be more officially or more formally reflected? There is, it will be noted, an element of estoppel in the creation of customary law. How can a State be heard to say on one occasion that the law is such-and-such and later deny that this is the case?"[41]

31. Such official opinion, if it were not to be treated flippantly, must be taken to indicate the country's intention to conform its laws to the human rights standard. This, in itself, would justify the initiation of steps towards the review and reform of the law.

Declaration on population and human rights

32. Since "right" and "duty" are two sides of the same coin, acceptance of human rights entails a corresponding duty not only to refrain from activities which would impede the exercise of the right, but, positively, to undertake the necessary measures for the realization of such a right.

33. It may be seen that the Teheran Proclamation and the Declaration on Social Progress and Development have laid down certain minimum conditions for the exercise of the family planning right. Still other conditions may be implied as being necessary to enable couples to determine "freely and responsibly" the number and spacing of children. A composite list of 14 such conditions, without which the family planning right would prove illusory is given below:

(*a*) The right to adequate education and information on family planning;[42]

(*b*) The right of access to the means of practising family planning;[43]

(*c*) The right to the equality of men and women;[44]

(*d*) The right of children, whether born in or out wedlock, to equal status under the law and to adequate support from natural parents;[45]

(*e*) The right to work;[46]

(*f*) The right to an adequate social security system, including health and old-age insurance;[47]

(*g*) The right to freedom from hunger;[48]

[37] General Assembly resolution 2200 A (XXI) of 16 December 1966, annex.

[38] See *Griswold* v. *Connecticut,* 381 U.S. 479, 14 L. Ed. 2d 510, 85 S. Ct. 1678 (1965).

[39] For a summary of the ruling of the Irish Supreme Court in the McGee case that part of section 17 of the Criminal Law (Amendment) Act of 1935 banning the importation of contraceptives was unconstitutional for invasion of the right of privacy, see *The Times* (London), 20 December 1973. For a background of the case, see *The Irish Times,* 9 June 1972.

[40] See *Roe* v. *Wade,* 410 U.S. 113 (1973); *Doe* v. *Bolton,* 410 U.S. 179 (1973). For a new Tunisian law authorizing the artificial interruption of pregnancy "when performed during the first three months in a hospital, a health center, or an authorized clinic by a duly authorized practitioner", though without specifying the right of privacy as the basis thereof, see Décret-loi no. 73-2 du 26 septembre 1973, portant modification de l'article 214 du Code Pénal.

[41] J. P. Humphrey, *op. cit.* The "Ihlen Declaration", in Eastern Greenland Case (*Denmark* v. *Norway*), P.C.I.J., Ser. A/B, No. 53 (1933), 3 Hudson, *World Court Reports* 148 (1938), is instructive. An oral declaration by M. Ihlen, the Norwegian Minister for Foreign Affairs, in regard to Eastern Greenland having been relied upon by the Danish Government, was held by the Permanent Court of International Justice to be binding upon Norway. The Court concluded:

> "The Court considers it beyond all dispute that a reply of this nature given by the Minister for Foreign Affairs on behalf of his Government in response to a request by the diplomatic representative of a foreign power, in regard to a question falling within his province, is binding upon the country to which the Minister belongs ..."

Might not the same reasoning apply equally to recorded voting at the United Nations General Assembly or specially convened diplomatic conferences by duly accredited representatives of Governments?

[42] Teheran Proclamation on Human Rights resolution XVIII (1968).

[43] United Nations Declaration on Social Progress and Development, General Assembly resolution 2542 (XXIV) of 11 December 1966, art. 22 (*b*).

[44] Universal Declaration of Human Rights, art. 2; International Covenant on Civil and Political Rights, art. 3; International Covenant on Economic, Social and Cultural Rights, art. 3; and Declaration on the Elimination of Discrimination Against Women, General Assembly resolution 2263 (XXII) of 7 November 1967, arts. 1, 4, 6, 9 and 10.

[45] Declaration of the Rights of the Child, General Assembly resolution 1386 (XIV) of 20 November 1959, principles 1, 4, 6, 9 and 10.

[46] International Covenant on Economic, Social and Cultural Rights, General Assembly resolution 2200 A (XXI) of 16 December 1966, annex, art. 6.

[47] *Ibid.,* art. 9.

[48] *Ibid.,* art. 11 (2).

(*h*) The right to an adequate level of living;[49]

(*i*) The right to freedom from environmental pollution;[50]

(*j*) The right to liberty of movement;[51]

(*k*) The right of privacy;[52]

(*l*) The right of conscience;[53]

(*m*) The right to separation of Church from State, law from dogma;[54]

(*n*) The right to social, economic and legal reforms to conform with the above mentioned rights.[55]

34. Fulfilment of each of the above-mentioned rights requires, in turn, the fulfilment of certain preconditions. The first right, for example, presupposes a compulsory education, thus necessitating a revision of education law towards that end as well as permitting or requiring sex or population instruction in schools A law on compulsory education, however, cannot be enforced in the absence of a compulsory registration of births Also, existing laws on obscenity need to be changed if they forbid the publication, broadcasting, televising or mailing of family planning material. Regulations of publicly owned mass communication media should be re-examined with a view to determining their obligation to disseminate family planning information

35. To be studied also is the way in which the individual's right to adequate education can harmonize with the collective demands, especially in the face of a shortage in resources, both actual and potential [56] How may the conferment of certain benefits, like education allowances, while meeting the actual needs, not constitute a "bonus" for increased fertility? Conversely, how may the withdrawal of certain benefits, while [illegible]

contradicted in purpose by another law or frustrated in its implementation by inadequate or inconsistent administrative decrees?[57] What should be the relations between municipal and international law through the medium of human rights, which includes the family planning right?

36 It is obvious that a systematic approach to these problems calls for a joint and co-ordinated effort on the part of all government agencies concerned. The hitherto adoption of piecemeal legislation or measures focusing generally on the availability of contraceptives to the end-users must be seriously reconsidered.

37. The foregoing discussion shows the complexity of tasks confronting the socially conscious lawyer.

Methodology for relating law to world population

38. Convinced that it is time for lawyers and law schools to contribute to the solution of the population problem, the United Nations Fund for Population Activities, along with the International Planned Parenthood Federation and a few private organizations, has, since 1971, supported law and population projects in over 20 countries [58] Each of these projects involves a compilation stage, an analysis stage and a recommendation stage The second stage has been carried out in universities or Government-sponsored seminars in Costa Rica, Ghana, Indonesia, Lebanon, the Philippines and Sri Lanka These have been attended by government officials as well as experts and students, and have involved public administration, public health, sociology, demography and economics, as well as law. In these countries, the recommendation stage has now been reached and has, in several countries, borne results.

Compilation

39 Clearly, the laws that affect fertility behaviour and population in each country will be different from those of every other country and the way in which they have their effect will be different.

40 Since reform is impossible unless it is known what the law is and about it works, the compilation stage is the first step. Indeed:

> "Knowledge as to what a law actually provides is obviously a prerequisite step towards the work of assessing the impact of a law or patterns of decision-making relevant to population trends.... Nor are the prospects bright for any national family planning programme ... if it is [illegible] in disregard of laws and practices which operate in a contradictory manner nullifying and frustrating the objectives of the programme."[59]

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[49] *Ibid*, art 11 (1)

[50] *Ibid*, art 12 (2) (*b*); Declaration of the United Nations Conference on the Human Environment, principles 1, 8, 13, 15 and 16

[51] International Covenant on Civil and Political Rights, General Assembly resolution 2200 A (XXI) of 16 December 1966, annex, art 12

[52] *Ibid*, art 17.

[53] *Ibid*, art 18 (1)

[54] *Ibid*, arts 18 and 26

[55] This right flows logically from the fact that human rights are *ipso facto* legal rights entailing legal obligations on the part of Governments to undertake the necessary reforms to conform with such rights

[56] See para 61 and foot-note 63

[57] The effects of the French legalization of the sale and distribution of contraceptives in 1967, for example, must be weighed against yearly increases in family allowance payments, [illegible]

regulations restricting the [illegible] of abortions on an out-patient basis. *The New* [illegible]

[58] As of January, 1974 [illegible] law and population [illegible] is being carried out in the [illegible] Costa Rica, Egypt, [illegible] Lebanon, Malaysia, [illegible] Nepal, [illegible] tan, the Philippines, [illegible] Sri Lanka, [illegible] Togo, Tunisia and [illegible]

[59] K. Bentsi-Enchill, [illegible] law and population [illegible]

[illegible]

41. To make compilation effective, it was felt necessary to draw up a classification plan which lists all the possible types of law which should be considered. This plan is not only useful as a check-list for researchers but it provides a format for world-wide reporting, so that developments in each country can easily be compared. The outline [60] of this report is as follows:

- 100 Fertility regulation
  - 110 Sterilization
  - 120 Contraception
  - 130 Abortion
- 200 Family status and welfare
  - 210 Marriage
  - 220 Termination of marriage
  - 230 Extended family obligations
- 300 Children and child welfare
  - 310 Support of children generally
  - 320 Protection of children
  - 330 Artificial insemination
  - 340 Legitimacy of children
  - 350 Registration of births
- 400 Criminal offences penology
  - 410 Criminal law treatment of sexual activity
  - 420 Penology (as affecting ability of prisoners to continue family relations)
- 500 Public welfare
  - 510 Family allowances generally
  - 520 Housing assistance programmes
  - 530 Maternity leaves and benefits
  - 540 Old age and retirement benefits
  - 550 Death benefits to survivors
  - 560 Labour protection and employment standards
  - 570 Personal status and integrity
  - 580 Personal mobility (intra and international migration)
- 600 Public health
  - 610 Health insurance and medical assistance
  - 620 Hospital insurance and public clinics
  - 630 Control of medical facilities
  - 640 Medical profession (licensing, education and regulation)
  - 650 Drugs and pharmaceuticals
  - 660 Food distribution and control.
  - 680 Environmental protection programmes (efforts to control population growth as a means of protecting the environment)
- 700 Education
  - 710-720 Compulsory education
  - 730 Literacy programmes
  - 740 Adult education programmes
  - 750 Financial assistance to education
  - 760 Educational opportunities for women
  - 770 Education affecting population directly (health, sex, marriage, contraception and population)
- 800 Property and economic factors
  - 810 Income distribution measures generally
  - 820 Taxation
  - 830 Land tenure and land improvement programmes
  - 840 Distribution of decedents' property
  - 850 Employment guarantee and public works programmes
  - 860 Guaranteed wage and income subsidies
- 900 Miscellaneous
  - 910 Military service
  - 920 Religious law
  - 930 Other

42. The compilation task may be more difficult than at first appears. Statutes and decrees are often scattered throughout the body of the law, and administrative and judicial decrees and regulations are usually buried and, in many instances, not generally known. Moreover, customary law is hard to "compile"; and this, in turn, affects the important question of whether a particular piece of legislation is actually enforced or not. In addition to these problems, the compilation stage may be complicated in a country with a federal-state form of government, since state as well as federal laws may be involved.

Analysis

43. As suggested above, an indispensable component in the review of population law is the determination of the degree of compliance therewith and of the reasons for any divergence which may exist between law and practice.

44. Even in countries with relatively developed legal institutions, differences between the law on the books and the law in actual practice inevitably exist. The differences are much greater in many of the developing countries. Thus, adequate methodology involves not only an analysis of the formal legal framework, but a considerable amount of empirical investigation of what people are, in fact, doing under it. An important part of the analysis stage should, if possible, involve a systematic interviewing with such groups as physicians, nurses, pharmacists, public health and welfare officials, educators, prosecutors, judges, lawyers and legislators, as well as a sample survey of public opinion classified according to age, sex, religion, education, occupation, race and geographical region.

45. Needless to say, a successful investigation of this kind would hinge upon close co-operation with sociologists who are trained in the preparation of questionnaires, the conduct of field surveys and the

From the Perspectives of Law, Policy and Organization, Proceedings of the Second Annual Meeting of the International Advisory Committee on Population and Law, 30-31 October 1972, Tokyo, Law and Population Book Series No. 5 (Medford, Mass., Tufts University, 1973), pp. 17-18.

[60] For detailed breakdowns, see Morris L. Cohen, *Law and Population Classification Plan,* Law and Population Monograph Series No. 5 (Medford, Mass., Tufts University, 1972).

evaluation of results. A pilot project undertaken at the University of the Philippines in 1972 demonstrates the feasibility as well as desirability of such interdisciplinary co-operation.[61]

46. Reference has already been made to the legal status of the human right to family planning and to the minimum obligation on the part of Governments to initiate steps towards aligning their laws with the human rights standard. It follows logically that population laws must be reviewed to see whether they conform in theory and in fact with the principles of human rights and in particular with the 14 rights enumerated above in paragraph 33.

Formulation of recommendations

47 The final phase of the review process is the formulation of suggested revisions of laws the objective of which is the full realization of the "human rights" ideals, but which take into account not only existing laws, but the political, social, economic, religious and cultural factors which give rise to such laws. The resultant synthesis of practice and theory, and of realism and idealism, could help generate the necessary interest in legal reforms as well as provide a basis for concrete action Needless to say, it is essential to include government officials, particularly legislators, in this process.

CONCLUSIONS

48. Despite the shortness of the time in which law and population projects have been established, some legal changes of major significance have already occurred in countries where projects exist Only a few need be mentioned. The Philippine Labour Code of 1973, for example, contains the mandatory provision of family planning services in clinics which employers are required to maintain, limits the number (four) of maternity leaves with pay for female employees and requires the Department of Labour to develop incentive bonus schemes to encourage family planning. These provisions came on the heel of an earlier step by the Government to limit income-tax exemptions to four children

49 In his opinion, rendered 17 September 1973, the Philippine Secretary of Justice interpreted the Revised Penal Code as allowing "surgical sterilization for both sexes (tubal ligation and vasectomy)". Earlier, in his letter of support for the establishment of a law and population project in the Philippines, dated 16 March 1972, the Secretary of Justice stated:

"Having been endowed with the character of a 'human right', family planning therefore imposes not merely a moral but also a legal responsibility upon the state Our own government has a legal duty to see to it that laws and policies contradictory to this right should be amended or abolished, and new ones adopted in conformity with and in promotion of this right. To bring our present laws in consonance with official recognition of family planning as a right, it is necessary to institute systematic legal reforms, and thereafter to co-ordinate them into the legal mainstream."

50. On the local government level, the City of Cagayan de Oro has embarked upon a "Model City Project" directed to the realization of the principle that family planning is a basic human rights for its citizenry. In September 1973, the City Mayor issued an Executive Order (No 9-73) *establishing the Population Planning* Commission, which will serve as the policy-making body and co-ordinate all population activities for the city

51. In Indonesia, the Government has limited family allowances to three children.

52. In Mexico, the new Sanitary Code of 1973 not only legalizes the use of contraceptives, but calls for their official distribution and provides the authority for the training of paramedical personnel for family planning services, including training in the insertion of IUDs.

53. The Government of Tunisia liberalized its abortion law on 26 September 1973 (Décret-loi No. 73-2), to allow the artificial interruption of pregnancy if "performed during the first three months in a hospital, a health centre, in an authorized clinic by a duly authorized practitioner". Earlier, speaking on the eve of the *Mouled*, a religious holiday, in April 1973, President Bourguiba declared that since voluntary sterilization, unlike castration, does not interfere with the conjugal functions, it is not contrary to Moslem law.

54 Both Pakistan and Thailand have lifted the prescription requirement for pills so as to increase their distribution.

55 Moreover, the "spill-over" effects of law and population projects should not go unmentioned. In October 1973, the Management and Planning Committee of the International Planned Parenthood Federation (IPPF) resolved to establish a panel of experts on the matter of "law and Planned Parenthood". The purpose of the panel is to work with the IPPF constituent national associations in bringing about revisions in legislation which affect the activities of the IPPF.

56 In his welcoming address to the Seminar on Voluntary Sterilization and Post-Conceptive Regulation, sponsored by the IPPF South-East Asia and Oceania Region at Bangkok, 30 January-2 February 1974, the Minister of Public Health of Thailand, Dr. Udom Posakrisana, drew attention to the fact that the laws of the countries in that region, with a few exceptions, were lagging behind people's actual practice. He *continued:*

"This lag is dangerous and expensive, both in terms of fostering public discontent for outmoded laws and, by extension, for law itself; and i erms

[61] L T Lee and R A Bulatao, "In-depth study on law and fertility behavior preliminary observations", mimeographed, 1972.

of delaying the attainment of our goals of improved family health and accelerated national development. Unless many of our countries update their existing laws governing voluntary sterilization and post-conceptive regulation, the law itself—rather than popular acceptance or technical problems—will become the largest obstacle in the way of wider practice. I was therefore especially glad to note that the programme for your Seminar includes a consideration of the legal status of sterilization and post-conceptive regulation. I hope that Seminar participants will be stimulated by this discussion to return to their countries to take an active part in the review, at a national level, of their countries' existing laws and regulations governing these family planning procedures."

57. The Government of Lebanon appointed a Population Planning Commission in 1973 to formulate and co-ordinate population policies and programmes. The Law and Population Project in Lebanon plans to broaden its scope of activities in observance of the International Women's Year, 1975, by compiling all the laws bearing on the status of women in each of the countries of the Middle East region.

58. In Morocco, a substantial population component was built into the Five-Year Development Plan (1973-1977), thus forging a link between population and development.

59. In Kenya, the Law and Population Project has initiated contact with the United Nations Environment Programme (UNEP), headquartered at Nairobi, to explore the possibility of expanding its compilation of population-related laws to include also environmental laws, thus strengthening the co-operation among UNFPA, the United Nations Development Programme (UNDP) and UNEP.

60. In summary, recognition of human rights as entailing legal, and not just moral, responsibility upon States holds vast potential for opportunity, particularly in the field of population law. Aided by a custom-generating process through the United Nations, the human rights aspects of population obligate Governments to match deeds with words and enable lawyers to contribute to the solution of one of the most critical social problems of our times.

61. Many problems remain, however, to test the inventiveness and ingenuity of lawyers. To give but one example: the question may be raised whether the language of the Teheran Proclamation would allow couples to have as many children as they want (or do not want). The Proclamation specifically provides that family planning must be made not only "freely", but also "responsibly". Involved in a responsible parenthood is the balancing of the "individual" with the "collective" right—i.e., from the right of children to that of the society at large. Just as the individual right to freedom of speech must take into account the collective right whether in time of peace (e.g., libel, defamation, nuisance, obscenity) or during war or emergency (e.g., treason, sedition, censorship), so must the individual right of family planning be harmonized with the collective right, particularly where the resources, both actual and potential, of a country dictate the limitation of the size of its population in the interest of all. The question when exactly the individual right gives way to the "collective" is always difficult to answer—even in the case of freedom of speech notwithstanding its century-old development and refinement.[62] However, it is equally clear that inability to define with exactitude the relationship between the two rights does not negate their existence.

62. The first step, perhaps, to the solution of the above-mentioned dilemma is the active involvement of the law and lawyer in population matters, as proposed in this paper.

[62] This problem of balancing the individual with the collective was also discussed at the United Nations Symposium on Population and Human Rights, Amsterdam, 21-29 January 1974. The Symposium, however, was unable to reach a consensus on this problem.

OBJECTIVES AND PRINCIPLES OF THE WORLD POPULATION PLAN OF ACTION

Wendy Marson Dobson *

1. The purpose of this paper is to discuss the objectives of the Draft World Population Plan of Action and the principles and guidelines underlying these objectives, which should be observed in formulation of the Plan. The principles and guidelines will be based on internationally recognized values and goals reflected in political decisions of United Nations bodies and in international instruments.

2. A review has been undertaken of the content of existing international instruments, including the Charter of the United Nations, proclamations, declarations, conventions, convenants and other resolutions from intergovernmental bodies of the United Nations. These bodies include the General Assembly, the Economic and Social Council and its functional and regional economic commissions, the United Nations Development Programme (UNDP), the United Nations Children's Fund (UNICEF) and the specialized agencies.

3. In 1972, the Department of Economic and Social Affairs of the United Nations Secretariat convened a metting of an Advisory Committee of Experts on Global Population Strategy to discuss the objectives and content of a Plan of Action. This paper is based on discussions of that Committee in 1972 and 1973.

Objectives of the draft World Population Plan of Action

4. A suggested set of objectives for the Plan, based on discussions of the Expert Group, based on the technical background study to the Plan and on relevant discussions of the role of the United Nations system in population is as follows:

(*a*) To advance understanding of population at global, regional, national and subnational levels, recognizing the diversity of the problems involved;

(*b*) To advance national and international understanding of the interrelatedness of demographic and socio-economic factors in development; of the nature and scope of the contribution of demographic factors to the attainment of over-all goals of advancing human welfare, on the one hand, and the impact of broader social, economic and cultural factors on demographic behaviour, on the other;

(*c*) To promote the development of population policies not only in the field of family planning, but with regard to other socio-economic measures and programmes designed to affect reproduction and family formation, and with regard to measures and programmes affecting morbidity, mortality, population distribution, internal and international migration and demographic structure;

(*d*) To recommend guidelines for population policies consistent with internationally recognized values and national goals;

(*e*) To encourage the development of appropriate training, statistical, research, information and education services in pursuit of the above-listed objectives.

5. The first objective is important in so far as the Plan must not concern itself solely with the global population situation; that is, the problem as defined by "averaging" national demographic growth and distribution characteristics The Plan must also recognize that these characteristics vary in the relative importance accorded them in differing regional and national situations. Thus, while one country may consider its population growth to be too rapid and an obstacle to development, another, with similar rates of growth, may consider it to be too slow—or consider itself underpopulated

6 The second objective is comprehensive. The Plan should recognize that measures to influence population growth or distribution are not ends in themselves. Rather, the over-all goal of development is the enhancement of individual human welfare. Population policies are means to that end. It should also recognize the importance of interrelationships between population and the other factors in development in so far as the complexity of these interrelationships is being taken into account by the international community. To the extent that population variables present obstacles to development efforts, "population problems" can be diagnosed. Population problems can be defined as growth at too slow or too rapid a rate for the achievement of desired rates and levels of development, or as maldistribution of the population To deal with these problems, social and economic measures may be formulated. They may be implicit measures and their impact may be indirect, their main purpose being the promotion of some larger social goal.

7. The third objective of the Plan should be that of promoting more widespread recognition and unde

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standing by the international community of the nature and scope of population policy. During the past decade, much attention has been accorded family planning programmes not only as a means of assisting couples to regulate fertility, but as a public policy measure to reduce rapid population growth. Unrealistic expectations of the demographic impact of such programmes have been frequently formulated. Other demographic problems and measures have received much less attention. Thus, the Plan should promote a broader appreciation of the diversity of demographic problems existing in the international community and of the wider range of programmes and measures to deal with them.

8. The fourth objective of the Plan is the development of international standards which should be met by population policies. To be effective, any public policy should serve important human values as well as social objectives and national goals. Values reflected in the Charter of the United Nations, including preservation of individual freedom, fairness, promotion of the collective welfare and safeguarding human survival, should be taken into account in the formulation of policies to influence population events.

9. Lastly, having recognized differing population problems, having considered alternative measures to influence population events and having discussed standards for population-related measures, the Plan should encourage the allocation of international resources to activities necessary to achieving the objectives. These would include training, statistical and other research activity, information and education services and evaluation activities.

Principles underlying the draft World Population Plan of Action

10. A wide range of public policy possibilities to influence population events will be included in the World Population Plan of Action. A number of internationally recognized principles and guidelines should guide their formulation, reflecting technical standards and ethical values on which there is consensus among States Members. Many have been stated in United Nations instruments [1] and in intergovernmental conferences. Others have been formulated in discussions of the Expert Group. They include:

(*a*) A principle aim of socio-economic development is to improve levels of living and the well-being of all people—population goals and policies should also serve this ultimate objective;

(*b*) Population and development are interrelated: population variables influence development variables and are also influenced by them;

(*c*) Population policies are constituent elements of socio-economic development policies, never substitutes for them;

(*d*) Population policies, while serving socio-economic objectives, should be consistent with internationally and nationally recognized human values of individual freedom, justice and the survival of national and other population groups;

(*e*) While the main responsibility for achieving the objectives of this Plan of Action lies at the national level, international co-operation is essential;

(*f*) Recommendations in this Plan of Action with regard to policies to deal with population problems recognize diversity of conditions within and among different nations and recognize the sovereignty of national Governments in determining their population policies;

(*g*) The occurrence in the world of rapid demographic change accompanied by rapid social changes and changes in human values must be taken into account in formulating this Plan of Action;

(*h*) The objectives of this Plan of Action should be consistent with the objectives of the Second United Nations Development Decade; changes in demographic variables during the Decade are largely the result of past demographic events and the changes sought during the Decade will have social and economic repercussions up to and beyond the end of this century.

11. The first and fifth principles reflect a fundamental principle underlying the purpose of the United Nations, as set forth in Chapter I, Article I, of the Charter: "To achieve international co-operation in solving international problems of an economic, social, cultural or humanitarian character . . .".

12. The second principle underlies the first and second objectives of the Plan. The population-development relationship is a two-way relationship, population variables being influenced by development measures and vice versa. Policies should therefore be integrated. This principle goes hand-in-hand with the third and was recognized by the General Assembly in resolution 2211 (XXI) of 17 December 1966, Population Growth and Economic Development, which recognized:

> ". . . the need for further study of the implications of the growth, structure and geographical distribution of population for economic and social development, including national health, nutrition, education and social welfare programmes carried out at all levels of government activity. . . ".

It was also recognized in resolution 1838 (XVII) of 18 December 1962, Population Growth and Economic Development:

> ". . . economic development and population growth are closely interrelated, . . . Member States . . . in formulating their economic and social policies . . . useful to take into account the latest relevant facts on the interrelationship of population growth and economic and social development, and that the forthcoming . . . Asian Population Conference might throw new light on the importance of this problem, especially for the developing countries."

[1] See annex for a complete list of international instruments and documents referred to in this discussion.

13. The *Second Asian Population Conference in* 1972 reaffirmed the "importance of integrating population into the strategy of the Second United Nations Development Decade". In resolution 1486 (XLVIII) of 3 April 1970, the Economic and Social Council urged recognition of this principle in its resolution on "Work programmes and priorities in the field of population":

> "7 *Urges* interested Governments of States Members of the United Nations and members of specialized agencies to give full attention to population programmes in development planning and in policy-making and to utilize the available resources to this end,".

14. A fourth principle underlying the Plan's objectives relates to the development of ethical guidelines for policies Policies will only be effective to the extent to which they observe important national values and goals This includes recognition of the rights and freedoms of *individuals, and obligations of the State, which should* be taken into account in formulation and implementation of policies to influence population variables. Observance of this principle may constrain policy choices for public intervention by States Members. Some standards may also be unacceptable to some States *However, the discussion of such standards in the World* Population Plan of Action will be based on values observed in the Charter of the United Nations and in United Nations instruments. They may be adapted as appropriate by States Members of the United Nations

15. Recognition of the sovereignty of national Governments in determining their population policies is the sixth basic principle guiding the Plan. Just as it must be recognized that different countries perceive their population problems differently, their sovereignty in dealing with them must be recognized. This principle has been repeatedly recognized in United Nations *instruments*

(*a*) General Assembly resolution 1838 (XVII) of 18 December 1962. "*Recognizing further* that it is the responsibility of each Government to decide on its own policies and devise its own programmes of action for dealing with the problems of population and economic *and social progress;*"

(*b*) World Health Assembly resolution 18.49, May 1965 "*Bearing in mind* that it is a matter for national administrations to decide whether and to what extent they should support the provision of information and services to their people on the health aspects of human *reproduction,*"

(*c*) General Assembly resolution 2211 (XXI) of 17 December 1966. "*Recognizing* the sovereignty of nations in formulating and promoting their own population policies with due regard to the principle that the size of the family should be the free choice of each individual family;"

(*d*) General Assembly resolution 2626 (XXV) of 24 October 1970: "Those developing countries which consider that their rate of population growth hampers *their development will* adopt measures which they deem necessary in accordance with their concept of development;"

(*e*) General Assembly resolution 2683 (XXV), 1970· "*Acknowledges* that the formulation and implementation of population policies and programmes are matters falling under the internal competence of each country and, consequently, that international action in the population sphere should be responsive to the varied needs and requests of individual Member States;"

(*f*) Economic and Social Council resolution 1672 (LII) of 2 June 1972. ". . to ensure, in accordance with their national population policies and needs, that information and education about family planning, as well as the means to practice family planning .";

(*g*) Declaration of the Stockholm Conference on the Human Environment, Principle 16. "... Demographic policies . which are deemed appropriate by Governments concerned, should be applied . .";

(*h*) Economic and Social Council resolution 1763 (LIV) of 16 May 1973· "*Aware* of the fact that there are considerable differences in the population and demographic situations in each country and that it is therefore necessary to adopt different approaches and solutions for each country, . ."

In these texts, it is recognized that it is up to each Member State to define its problem and to determine the appropriateness of measures to deal with these problems. The United Nations system may recommend alternative actions, but in providing assistance, it should be responsive to requests of individual States

Guidelines for population policies in the plan of action

16. The acceptability of policies to influence population variables is an important factor to be considered [illegible] in the World Popu- [illegible]

[illegible]

and as recognized in other United Nations instruments, *may form the basis for guidelines. The Preamble of the* Charter of the United Nations recognizes several important values:

> "to reaffirm faith in fundamental human rights, in the dignity and worth of the human person, in the equal rights of men and women ...,
>
> "to establish conditions under which justice and respect for the obligations arising from treaties and other sources of international law can be maintained, and
>
> "to promote social progress and better standards of life in larger freedom".

The Purposes and Principles of the United Nations, as set out in Chapter I, Article I, of the Charter, include the following purpose:

"3. To achieve international co-operation in solving international problems of an economic, social, cultural, or humanitarian character, and in promoting an encouraging respect for human rights and for fundamental freedoms for all without distinction as to race, sex, language, or religion."

Article 55 of the Charter further states:

"... based on respect for the principle of equal rights and self-determination of peoples, the United Nations shall promote:

"a. higher standards of living, full employment, and conditions of economic and social progress and development;

"b. solutions of international economic, social, health, and related problems; and international cultural and educational co-operation; and

"c. universal respect for, and observance of, human rights and fundamental freedoms for all without distinction as to race, sex, language, or religion."

17. From these statements, four basic human values can be identified, which may form a basis for policy choices:

(*a*) Freedom: encouragement of fundamental freedoms for all;

(*b*) Equity and justice: observation of the principle of equal rights and self-determination of peoples without distinctions;

(*c*) Promotion of general welfare: through social progress, better standards of life and solutions to problems of economic, social, cultural or humanitarian character;

(*d*) Promotion of security/survival of human group(s), by taking measures to strengthen universal peace.

The potential impact of policies on these values should be taken into account in assessing their feasibility. Policies that promote population goals and serve these values may be viewed as desirable and potentially effective. This section of the paper reviews the definition and application of these criteria in existing United Nations instruments and discusses aspects of their implementation in relation to the World Population Plan of Action and policy alternatives suggested therein.

Freedom

18. References to freedom in United Nations instruments include the following concepts: freedom from restraint or coercion, and the desirability of choice among alternative courses of action. The implication is made that freedom is promoted when the individual has knowledge and means of exercising available alternatives, as well as knowledge of the probable consequences of these actions. The instruments do not deal with the assertion that no one has free choice, that everyone is subject to implicit social pressures which narrow the range of options, nor do they deal with the question of how Governments may intervene to provide knowledge to the individual. By its very nature, government intervention may influence freedom of choice by restricting information and opportunities available to the individual, thereby influencing selection among options.

19. The instruments have, to varying degrees referred to the freedom of individuals to make decisions as to the size and spacing of their families; freedom to choose the location of residence and employment; freedom from conditions causing illness and death. Exercise of these freedoms are fundamental considerations in population policy, for each has demographic consequences.

Freedom of choice in size and spacing of family

20. The right of the couple, of parents, of the family, of girls and women to make informed decisions on the size and spacing of their families, has been recognized in the following instruments:

(*a*) Commission on the Status of Women resolution 7 (XVIII), 1965: "*Considering* that married couples should have access to all relevant educational information concerning family planning, ..."

(*b*) World Health Assembly 18.49, May 1965:

"*Recognizing* that problems of human reproduction involve the family unit as well as society as a whole, and that the size of the family should be the free choice of each individual family;

"*Bearing in mind* that it is a matter for national administrations to decide whether and to what extent they should support the provision of information and services to their people on the health aspects of human reproduction;"

(*c*) General Assembly resolution 2211 (XXI) of 17 December 1966: "... with due regard to the principle that the size of the family should be the free choice of each individual family,"

(*d*) General Assembly resolution 2263 (XXII) of 7 November 1967, article 9:

"All appropriate measures shall be taken to ensure to girls and women, married or unmarried, equal rights with men in education at all levels, and in particular:

... (e) Access to educational information to help in ensuring the health and well-being of families."

(*e*) Proclamation of Teheran, 1968: "*Proclaims* ... the protection of the family and of the child remains the concern of the international community. Parents have a basic human right to determine freely and responsibly the number and spacing of their children."

(*f*) International Conference on Human Rights, resolution XVIII, Human Rights Aspect of Family Planning:

"*Believing* ... it is timely to draw attention to the connection between population growth and human rights,

...

"3. *Considers* that couples have a basic right to decide freely and responsibly on the number and spacing of their children and a right to adequate information and education in this respect"

(*g*) World Health Assembly 21 43, May 1968, Requests the Director General ... to assist Member States ... with "(i) the integration of family planning within basic health services without prejudice to the preventive and curative activities which normally are the responsibility of those services, (ii) appropriate training programmes for health professionals at all levels,"

(*h*) General Assembly resolution 2542 (XXIV) of 11 December 1969:

"... Parents have the exclusive right to determine freely and responsibly the number and spacing of their children ...

"Article 22: (b) The formulation and establishment, as needed, of programmes in the field of population, within the framework of national demographic policies and as part of the welfare medical services, including education, training of personnel and the provision to families of the knowledge and means necessary to enable them to exercise their right to determine freely and responsibly the number and spacing of their children,"

(*i*) General Assembly resolution 2716 (XXV) of 15 December 1970· in setting targets for Maternal and Child Health for the Second United Nations Development Decade: "Making available to all persons who so desire the necessary information and advice to enable them to decide freely and responsibly on the number and spacing of their children and to prepare them for responsible parenthood, including information on the ways in which women can benefit from family planning Such information and advice should be based on valid and proven scientific expertise, with due regard to the risks that may be involved."

(*j*) Advisory Committee on the Application of Science and Technology to Development, Report on Population, 1972.

"91. A program of studies should be especially aimed at the human rights aspects of family planning, with respect to both the rights of mothers and the rights of children to be born into an environment which, given the general social and cultural situation, is optimal for their growth and development."

21. As early as 1963, the First Asian Population Conference expressed the concerns of Asian States with the importance of preserving individual freedom in the implementation of State family planning programmes: "In programmes aimed at promoting family planning, individuals should in all cases be left free to select the methods which they prefer for spacing and limiting births, in accordance with their religious convictions and other preferences."[2] Subsequently, similar resolutions were passed by the Commission on the Status of Women and the World Health Assembly in 1965. In 1966, the General Assembly first recognized the principle of the "family's" right to freely choose the size of the family in resolution 2211 (XXI) on Population Growth and Economic Development, which was unanimously adopted

22. The principle was refined by the International Conference on Human Rights in 1968. There, resolution XVIII was submitted by Finland, India, Morocco, Pakistan, Sweden, Tunisia, the United Arab Republic, United Kingdom of Great Britain and Northern Ireland, and Yugoslavia with the original text· "3. Considers that parents have a basic human right to decide on the number and spacing of their children and a right to information and available services in this respect". In *Committee discussions, this text was subsequently* amended by Chile and Belgium to read "3 Considers that couples have a basic human right to decide freely and responsibly on the number and spacing of their children and a right to adequate information and education in this respect". It was passed by a vote of 49-0 with 7 abstentions The Belgian delegate proposed the revised phrasing should include "responsibly" as follows:

" . right of couples to decide on the number of their children should never be exercised selfishly, but with the interest of the unborn children at heart. Before bringing children into the world, parents should consider the means available to them, they bear a responsibility to their children in that respect, in which duty should take priority over right"

23. This resolution referred for the first time to the *duty* of couples and the obligations of the State in the exercise of the family planning freedom. Subsequent resolutions of the General Assembly in 1969 and 1970 further elaborated the obligations of the State The Declaration on Social Progress and Development, resolution 2542 (XXIV) of 11 December 1969 was most explicit in its recommendation that Member States formulate and establish programmes which would provide couples with both the knowledge and means to exercise their rights Debate on article 22 (*b*) included opposition to inclusion of reference to the provision of "means" to exercise the right. Efforts were made to confine the recommendation to· "(*b*) the formulation and establishment, as needed, of programmes in the field of population, within the framework of national demographic policies". The final vote on this section was 60-16 with 17 abstentions. Those opposed included Argentina, Austria, Bolivia, Brazil, Chile, Dominican Republic, Ethiopia, Ireland, Italy, Mexico, Mongolia, Nicaragua, Peru, Philippines, Portugal, and Spain. However, in 1970, additional specific references were made to the provision of services in setting targets in Maternal and Child Health for the Second United Nations Development Decade (resolution 2716 (XXV) of 15 December 1970). This resolution was adopted unanimously. In 1972, the Advisory ittee o

[2] *Report of the Asian Population Conference and Selected Papers* (United Nations publication, Sales No 65 II F 11), chap VII

Application of Science and Technology to Development recommended that "... attention should be given to the availability, distribution and use of contraceptives, and to legal provisions regarding abortion and voluntary sterilization". This recommendation raises a question about the definition of services to space and limit births. Do these implicity include abortion and sterilization services as well as contraception?

24. General Assembly resolution 2542 (XXIV) of 11 December 1969 also referred to the "exclusive right" of parents on the one hand, and on the other, to the establishment of programmes "within the framework of national demographic policies". This reference raises additional questions about the role of the State vis-à-vis parents. If parents have "exclusive rights" then it would appear that the State should not undertake any action to influence their choice of family size, no matter what the larger demographic or development objectives. If parents desire large families, thereby contributing to rapid population growth (assuming falling mortality), it can be argued that the State should not intervene with anti-natalist measures. Yet, in the same resolution, it is recommended that "national demographic policies" be taken into account. In such a context, this reference is contradictory since the "exclusive right" of parents has already been recognized. These instruments do not fully come to grips with the underlying issue of individual freedom and the rights of the State to consider larger social objectives. Should they assert the right of every parent or couple to family planning information, regardless of society's demographic objectives? This is a very real issue in countries that consider themselves under-populated. The argument has been made that the State should not deny family planning or contraceptive information and services, and that other policy measures should be the major means to promote population growth.

25. Equally important is the obligation of the State to assist those couples and individuals who have sub-fertility problems. They have the right freely to determine the size and spacing of their families. Again, the States's obligation to assist them, regardless of its over-all demographic objectives, needs to be clarified. World Health Assembly resolution 21.43, in 1968, refers to the provision of sub-fertility assistance, implicitly referring to the State's obligation: "... Reiterating the opinion that every family should have the opportunity of obtaining information and advice on problems connected with family planning, including fertility and sterility; ..."

26. In summary, international instruments have reached some consensus on the obligation of the State to provide information and means to parents to enable them to exercise the family planning right. They have not, however, resolved the question whether States have this obligation, regardless of their over-all demographic objectives. Lastly, they have not, outside of the World Health Organization (WHO), defined the nature of "information and means" to include services to promote as well as regulate fertility. The recommendation in 1972 of the Advisory Committee on the Application of Science and Technology to Development would, furthermore, imply that services to regulate fertility should include abortion and sterilization services as well. These are issues which might be resolved in the World Population Plan of Action.

27. The International Conference on Human Rights held at Teheran in 1968 introduced in its resolution the concept of the duty of parents to determine "responsibly" the spacing and size of their family. The text of the resolution, however, fails to make clear the views of the Conference as to parental obligations to consider both the individual and the social consequences of their actions. The implication of the term "responsibly" is that someone, presumably the State, may define appropriate behaviour and may penalize behaviour it deems irresponsible. In this regard, the Universal Declaration of Human Rights, in article 29, has referred to the duty of the individual to consider the social consequences of the exercise of individual freedom:

> "1. Everyone has duties to the community in which alone the free and full development of his personality is possible.
>
> "2. In the exercise of his rights and freedoms, everyone shall be subject only to such limitations as are determined by law solely for the purpose of securing due recognition and respect for the rights and freedoms of others and of meeting the just requirement of morality, public order and the general welfare in a democratic society."

It can further be argued that the ideal expressed has little relevance in many contemporary countries, unless the State exercises its obligation to make the information and means available to all individuals and couples. Even then, it is a question whether it is realistic to expect a change in individual behaviour in the light of information on the collective consequences of that behaviour.

28. A subsidiary issue raised in these instruments relates to the varying definitions of the individuals to whom they are directed. In all, they refer to the following units as having freedom of choice: the "individual family"; "parents"; "couples"; "families"; and "all persons who so desire". Furthermore, General Assembly resolution 2263 (XXII) of 7 November 1967, on Elimination of Discrimination Against Women, states that "girls and women ... should have access to educational information to help in ensuring the health and well-being of families". General Assembly resolution 2716 (XXV) of 15 December 1970, recommends that information be made available on ways women can benefit from family planning. Once again, the valuation inherent in the resolution is ambiguous, and should be clarified.

Freedom of movement

29. The second freedom of concern in formulation of standards refers to freedom of individuals to move to

better employment or living conditions. Most States have long had very specific policy regulating the inflow of international migrants in particular. Many use coercive measures to regulate flows by specifying standards which must be met by immigrants and by setting annual admission quotas. Some have rules with [illegible]

in article 13 of the Universal Declaration of Human Rights:

"1. Everyone has the right to freedom of movement and residence within the borders of each State

"2. Everyone has the right to leave any country, including his own, and to return to his country "

It has also been recognized in the International Convention on the Elimination of All Forms of Racial Discrimination,[3] article 5 (d):

"... States parties undertake .. to guarantee the right to everyone ... to equality before the laws, notably in the enjoyment of the following rights·

"(d) ...

(i) The right to freedom of movement and residence within the border of the State;

(ii) The right to leave any country, including one's own, and to return to one's country;"

30. Concern expressed in operative instruments relates mainly to learning more about the determinants of the "brain-drain" from developing countries and finding measures to halt the flow. The freedom of trained persons to migrate to better job opportunities in the developed countries is not, however, questioned. General Assembly resolution 3017 (XXVII), on Outflow of Trained Personnel from Developing to Developed Countries·

"*Invites* the Secretary-General, in collaboration with the organizations of the United Nations system ... to draft ... guidelines for a programme ... practical and effective guidance to be followed, mainly by the Governments of industrial- [illegible]

Declaration of Human Rights."

The Commission for Social Development, at its twenty-third session in 1973, passed a resolution on migrant workers,[4] calling for promotion, particularly through the International Labour Organisation (ILO), and adoption of international standards relating to "equality of opportunity and treatment of migrant workers, and their social protection" This legislation recognizes the freedom of workers to migrate, and calls mainly for their protection from exploitation, and for freedom of opportunity for them and their children. In addition, considerable legislation was adopted, as early as 1949, by the General Conference of the ILO concerned with recommendations of standards member States should observe in the treatment of migrant workers Similar legislation does not exist, however, with respect to refugees and nomads, who present demographic problems in particular areas of the world

31 This whole area of migration is politically sensitive. Religious, ethnic and political factors are included as causative factors in such movement. The imposition of international boundaries on areas through which nomads have traditionally wandered imposes a problem where none previously existed The feasibility of developing international standards is questionable, but nevertheless desirable. This principle was recently affirmed by the Economic and Social Council at its fifty-fourth session in resolution 1788 (LIV), 4 June 1973, which.

"2. *Affirms* the need for Governments, with respect to the enjoyment of the right of everyone to leave any country, including his own, and to return to his country, to bear in mind the relevant resolutions of the United Nations, the provisions of article 13 of the Universal Declaration of Human Rights, and other relevant provisions of the Declaration, the provisions of the International Covenant on Civil and Political Rights and the Charter of the United Nations "

This resolution recommends that Governments observe these rights, "when considering legislation or regulations dealing with the question of freedom and non-discrimination in respect of everyone to leave any country, including his own, and to return to his country". Furthermore, the question is to be retained on the agenda of the Commission on Human Rights

Freedom from morbidity and mortality

32. The right of individuals to freedom from disease and to the means of promoting health has been implicitly recognized in the Charter of the United Nations, Chapter IX on International Economic and Social Co-operation, Article 55, " .. the United Nations shall promote· ... (b) solutions of international economic, social, health and related problems". The World Health Organization is devoted to assisting member States with development of health services to provide preventive and curative facilities to their populations, and particularly maternal and child health care. Many pieces of World Health Assembly legislation are devoted to recommendations on ways to improve delivery and distribution of health services. The International Covenant on Economic, Social and Cultural Rights (General Assembly resolution 2200 A (XXI) of 16 December 1966), states in article 12

"1. The States Parties to the present Covenant recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health

[3] General Assembly resolution 2106 A (XX) of 21 December 1965.

[4] *Official Records of the Economic and Social Council, Fifty-fourth Session, Supplement No 5*, chap XIII

"1. Men and women of full age, without any limitation due to race, nationality or religion, have the right to marry and to found a family.

. . .

"3. The family is the natural and fundamental group unit of society and is entitled to protection by society and the State.";

(*b*) General Assembly resolution 1838 (XVII) of 18 December 1962. "*Recognizing* . . . that the health and welfare of the family require special attention in areas with a relatively high rate of population growth,",

(*c*) Proclamation of Teheran, 1968: ". . *Proclaims* . . . the protection of the family and of the child remains the concern of the international community."

These instruments imply an obligation by the State to consider consequences of population policies for the integrity of the family. Missing, however, is reference to the importance of the "integrity of the family" in relation to other values. Must it be maintained at all costs? Policies to moderate rapid growth or to promote migration may separate spouses, as well as parents and children. Policies enhancing role alternatives for women may take them out of the home, and loosen the bond between mother and child State services for child care, which may be pro-natalist in effect, may at the same time weaken the family as it is traditionally regarded If this is the case, should such policies be abandoned? It would appear that this particular criterion recognizes the institution of the family in a narrow sense, without recognizing alternatives to traditional families, which allow for greater freedom for women and have demographic impacts.

38. Recognition of the particular importance of protecting the family and promoting the welfare of future generations was made at the first World Health Assembly in 1947; resolution 1 43 recommended that Governments take necessary measures to care for pregnant women, and for the upbringing of children, recognizing that "the children of today represent the whole future of humanity . .". The resolution states

> "Whereas [it is considered that] the children of today represent the whole future of humanity and that maternal and child health is a problem of primary importance,
>
> "THE FIRST WORLD HEALTH ASSEMBLY
>
> "*Recommends* that Governments take—subject to the conditions in their countries—preventive, curative, legislative, social and other measures necessary for the protection of the health of mothers before, during and after confinement, as well as for the welfare and upbringing of children, drawing special attention to·
>
> "(i) the protection of the health of adolescents—particularly girls—and expectant and nursing mothers who are employed in gainful occupations, and the prohibition of the gainful employment of children;
>
> "(ii) introduction of leave of absence for expectant mothers and leave after the birth of the child, with the continuation for the duration of leave of adequate wages;
>
> "(iii) access to adequate attendance for mothers during the birth of the child, both at home and in hospital, especially for artificially aided births;
>
> "(iv) the organization of non-governmental and governmental institutions where adequate medical consultation on pregnancy hygiene and on feeding, care, and upbringing of children can be made accessible to families "

This theme is reiterated in General Assembly resolution 1386 (XIV) of 20 November 1959, the Declaration on the Rights of the Child, and in resolution 2542 (XXIV) of 11 December 1969, the Declaration on Social Progress and Development.

39 The second aspect of general welfare referred to in the instruments is recognition of population trends as obstacles to social and economic development, and therefore to improvement in levels of living and the "quality of life" References in instruments include

(*a*) International Conference on Human Rights, resolution XVIII, 1968

> "1. *Observes* that the present rapid rate of population growth in some areas of the world hampers the [illegible]
>
> medical care, social security, education and social services, thereby impairing the full realization of human rights,
>
> "2. *Recognizes* that moderation of the present rate of population growth in such areas would enhance the conditions for offering greater opportunities for the enjoyment of human rights and the improvement of living conditions for each person,"

(*b*) General Assembly resolution 2626 (XXV) of 24 October 1970 "Those developing countries which consider that their rate of population growth hampers their development will adopt measures which they deem necessary in accordance with their concept of development ";

(*c*) Declaration of the United Nations Conference on the Human Environment, held in Stockholm in 1972, principle 16·

> "Demographic policies, which are without prejudice to basic human rights and which are deemed appropriate by governments concerned, should be applied in those regions where the rate of population growth or excessive population concentrations are likely to have adverse effects on environment or development, or where low population density may prevent improvement of the human environment and impede development."

These instruments advocate policies to influence population growth and density where continuation of current

trends would hamper progress to enhance social and individual well-being. However, while recognizing that such trends may be obstacles to development, they do not come to grips with the questions of who makes this judgement and on what grounds. The danger exists that such measures may be used as substitutes for more serious structural changes needed to achieve the stated welfare goals. It raises the difficult question of who pays the real costs and who benefits from amelioration of population trends. Slowing population growth may achieve greater growth in income, but is individual welfare enhanced? If income is maldistributed, the poor may be worse off—no better off in income, yet no better off in the number of children (assuming they have fewer) and the tangible and intangible benefits those may bring.

40. In summary, existing instruments are incomplete and unclear in their treatment of the general welfare criterion. The issue of conflict between policies which may enhance the collective welfare, in the sense of ameliorating population trends, and their effects on the integrity of the family, is not joined. Hence it is not possible, in the World Population Plan of Action, to make judgements as to the relative collective costs and benefits of policies which have anti-natalist effects, yet at the same time may weaken the institution of the family. Perhaps the "integrity of the family" as an indicator of general welfare is not correct and should be refined. With respect to achievement of development goals, more care should be taken in referring to the gains of ameliorating population trends, since if the benefits are not distributed, those who gain the least, yet suffer the costs of moderating the trends, may be no better off and, indeed, may be worse off.

Distributive justice

41. The third major guideline to be applied to population policies in the World Population Plan of Action is the extent to which they are just and fair. In the Charter of the United Nations, this value is referred to as the "principle of equal rights", and "respect for freedoms . . . without distinction . . .". In its application to policy, it generally refers to the fair application of policies and to the just distribution of goods, services and knowledge among the population. With respect to implementation of measures included in the Plan, two major distributional questions may be considered.

42. The first question relates to accessibility of necessary information and services—in family planning in particular. Do all sectors of the population have access to the necessary information and services to regulate their fertility and family size? In many countries, such services are often lacking in rural and low-income areas, giving rise to maldistribution and differential availability. Similarly, with respect to information about job opportunities, information is frequently maldistributed and many migrants move in response to erroneous information, often leading to serious problems of urban unemployment. In relation to mortality and morbidity, differentially available information, health services, and nutritional factors give rise to highly unequal mortality and morbidity experiences, by age, geographical and socio-economic groups, in particular.

43. The second distributional question relates to the application of policies in ways that influence existing inequities. Should measures be applied in such ways that their impact on different groups is equalized? There are some important examples, particularly in relation to economic incentives in population programmes, which impact unevenly by the very fact that they are economic incentives. Such incentives are bound to be more attractive to the poor, especially if they are direct, immediate monetary incentives. As a result, behaviour may be disproportionately affected among the poor. When that behaviour is reproductive behaviour and irreversible sterilization is the "price" of the incentive, serious questions about the justice of such measures and the effect on individual freedom must be raised. Similar questions may be raised with regard to inducements to participate in family planning or migration programmes. Should the State recognize that such inducements mean much more to the poor? Where this is the case, should the State acknowledge that the purpose in utilizing such programmes is to influence disproportionately the poor who tend to have the larger families (assuming a judgement has been made in favour of promotion of over-all welfare by changing the behaviour of the poor)? It can also be argued that where economic incentive is large and greatly desired by the poor, it closes other options and is a form of coercion.

44. Despite the obvious importance of this criterion, there is little reference in United Nations instruments to the need for distributional equity in population programmes. Article 21 of the Universal Declaration of Human Rights states: "2. Everyone has the right of equal access to public service in his country." Article 3 of the International Covenant on Economic, Social and Cultural Rights refers to the obligation of the State to ensure such equality: "The States Parties to the present Covenant undertake to ensure the equal right of men and women to the enjoyment of all economic, social and cultural rights set forth in the present Covenant." Further specific reference is made within the context of the Convention on the Prevention and Punishment of the Crime of Genocide. Article II (d) states: "In the present Convention, genocide means any of the following acts committed with intent to destroy, in whole or in part, a national, ethnical, racial or religious group, as such . . . (d) Imposing measures to prevent births within the group;".

45. With regard to equality of opportunity and freedom to move, specific reference is made in article 3 of the International Convention on the Elimination of All Forms of Racial Discrimination, prohibiting *apartheid*: "States Parties particularly condemn racial segregation and *apartheid* and undertake to prevent, prohibit and eradicate all practices of this nature in

territories under their jurisdiction." (General Assembly resolution 2106 A (XX), annex.)

Survival

46. The contribution of policy to ensuring survival of society, or of certain groups within society, is a criterion by which all policies are implicitly judged Yet, it is difficult to visualize population policies by themselves as ensuring (or seriously threatening) survival of a society or a country. The possibility of genocidal policies may, however, threaten the survival of a particular group. Specific references have been made in United Nations instruments to the potential contribution of population policies to deal with threats to peace and improved levels of living, but no reference to survival was found. The Declaration on Population by World Leaders in 1966 and 1967 stated "We believe that lasting and meaningful peace will depend to a considerable measure upon how the challenge of population growth is met" In 1968, the Proclamation of the International Conference on Human Rights recognized "Too rapid population growth seriously hampers efforts to raise living standards, to further education, to improve health and sanitation, provide better housing and transportation, ... human aspiration, common to men everywhere to live a better life is being frustrated and jeopardized ...". However, these statements do not clarify how population growth threatens peace. While such growth may hamper development, it is not necessarily seen as a threat to survival. An important issue in any such assertion would be the establishment of criteria for when the threat could be considered to exist. Survival is obviously a basic value, and other criteria, such as individual freedom, would obviously be subordinated to it, with potentially far-reaching consequences

47. Then, the question must be faced as to who has the right to define the threat to survival, and whether the cost in terms of human freedom is worth the price. Who pays the cost, i e., gives up reproductive freedoms? Who benefits, i.e., whose chances of survival improve? Are these the same or different people? How is their choice in the matter taken into account? What about the consequences for future generations? Are freedoms given up now to be denied future generations without consulting them? Or, are people willing to give up freedoms now to preserve or return freedom and ensure survival of future generations?

48. The paucity of references in United Nations instruments to relationships between population factors and survival and peace might be taken as an indication that the threat is not considered serious by most States. However, there is increasing discussion about the responsibility of Governments to consider the effects of national population trends and policies beyond their boundaries This view should be reflected in the Plan.

49. The preceding section has identified four major internationally recognized values which should guide and be recognized and maintained by population policies included in the World Population Plan of Action The extent to which these guidelines have already been defined and applied in existing United Nations instruments has been examined. It is obvious that they are not independent of each other, and that a number of problems and questions concerning their application may be raised

Application of guidelines

50. In the application of these guidelines to population policy, a number of factors must be considered which affect the definition, acceptance and relative priority with which States Members would use them. In addition, it is recognized that application would depend upon differing social, cultural, political and environmental considerations in States Members At the international level, and common to most national situations, factors to be considered would include: (*a*) relative importance accorded criteria by international forums; (*b*) definition of the problem with which policies are to deal (and time frame applied in this definition); (*c*) trade-offs or reconciliations to be made among values when alternative policies produce conflict between or among them.

Relative importance of guidelines

51 One of the primary factors to be considered in resolving conflicts among values would be the assignment of relative importance to each In the Plan of Action, such relative weighting may be derived from the attention accorded these values in United Nations instruments For such an exercise, the different instruments may also be weighted, depending upon their acceptance and adoption as standards by States Members In this context, covenants and conventions ratified by a majority of Member States would appear to have the most weight, since their ratification makes them legally binding Resolutions from the General Assembly and the Economic and Social Council, while not legally binding, would also represent a degree of consensus among States Members. Proclamations and declarations would have weight according to the degree of consensus underlying their acceptance at United Nations conferences and in the General Assembly Instruments formulated in the commissions of the Economic and Social Council and by regional bodies would have correspondingly less system-wide weight since they are formulated by smaller representations of States Members Instruments of a regional commission, formulated and supported by States Members from a particular region, would have importance geographically.

52 By this scheme, recognition of the freedom of couples to decide the spacing and size of their families has received the most recognition. Reference has been included in four General Assembly resolutions and the Proclamation of the International Conference
Rights, as well as the Asian Population Conferences. General Assembly resolutions include General.

resolutions 2211 (XXI) of 17 December 1966, on Population Growth and Economic Development; 2263 (XXII), 7 November 1967, the Declaration on Elimination of Discrimination against Women; 2542 (XXIV) of 11 December 1969, the Declaration on Social Progress and Development; and 2716 (XXV) of 15 December 1970, the Programme of Concerted International Action for the Advancement of Women. The first, second and fourth were adopted unanimously. The Declaration on Social Progress underwent debate and attempted revision of article 22 (*b*) to exclude reference to provision of knowledge and means. The article was subsequently passed by 60 favouring, 16 opposing, with 17 abstentions. Resolution XVIII on the Human Rights Aspects of Family Planning was passed by the International Conference on Human Rights by a vote of 49 in favour, none opposed and 7 abstentions. Freedom with regard to movement was specifically recognized in the Universal Declaration of Human Rights, adopted by the General Assembly. However, it has not been incorporated into legislation of States Members in the same way as freedom of choice with regard to family planning.

53. The general welfare criterion has not been explicitly dealt with in United Nations instruments, with the exception of concerns about preserving the integrity of the family (which conflicts with the outcome of other legislation eliminating discrimination against women) and concerns about rapid growth as an obstacle to development.

54. The distributive justice criterion has received remarkably little attention in United Nations instruments, with the exception of a statement of general principles in the Covenant on Economic, Social and Cultural Rights, and the General Assembly's Declaration on Social Progress and Development.

55. Lastly, the survival criterion has received little recognition as such, with the exception of the Declaration by World Leaders.

Definition of population problem

56. Another problem in application of these guidelines is the definition of the problem with which the policies are designed to deal. Implicit is the question of whose definition is being used. Environmentalists perceive population problems from the point of view of the impact of population on the environment and on survival. Some environmentalists weigh the survival criterion more heavily than the freedom criterion, and advocate policies which infringe on individual reproductive freedom at present, to ensure more options for the collective group vis-à-vis resource use and survival, at a future period in time. This point of view is not reflected in existing United Nations instruments. Others, more concerned with reducing obstacles to achievement of development objectives, advocate family planning programmes as a means of persuading and influencing individual choice to smaller family size. This point of view is reflected in the 1966-1967 Declaration by World Leaders and in the Proclamation of Teheran.

57. Values of family planners are reflected in the Proclamation of Teheran, originating in the United Nations system the concept of freedom of choice with regard to size and spacing of families. Family planners commonly advocate exercise of such freedom regardless of over-all, societal demographic goals. This value is accepted by a number of Governments, which, while considering population growth as deficient, support or allow family planning programmes to exist. Thus, it is important in considering the relative weighting of these criteria in the World Population Plan of Action, to consider also the interest groups and the sometimes differing perceptions of the population "problem" which these groups bring with them to their valuation of measures to deal with it.

58. Another factor affecting differing valuations of population problems relates to the time-frame used by those defining them. Conflicts are possible between serving current or future values. The time factor particularly influences trade-offs made by those primarily concerned with survival. As long as it is believed that population is a major factor in permanent depletion of resources, restriction of current and possibly future individual reproductive freedom may be valued on grounds that such action is necessary to survival or to maintenance of current levels of resource use. A similar stand may be taken by developmentalists who see unrestricted, unplanned population trends as obstacles to achievement of development goals.

Trade-offs

59. The preceding discussion has referred to the most basic issue to be faced in formulation of population policy—the reconciliation of values in choosing among alternative policies. The World Population Plan of Action will suggest a number of alternative measures which may be considered by States Members when confronting particular demographic goals. Some measures may enhance freedom, yet also threaten survival. Other measures may restrict freedom now to protect the range of choice for future generations. The question is how to choose the kind of public intervention. Such choice must depend upon the social ranking of the values involved.

60. At the international level, the question of such ranking has not received attention, nor has the question of trade-offs—giving up some of one value to gain more of another. The preceding discussion has indicated freedom of choice in family planning to be most highly valued, but no indication has been made as to whether and how much of it could be given up to assure survival or greater distributive justice at the same time. The Declaration of World Leaders and the Proclamation of the International Conference on Human Rights reconcile the major values: greater family planning freedom is a means of achieving welfare and survival goals. The Declaration on Social Progress and Development in-

cludes a value conflict between individual freedom ("the exclusive right of parents") and the collective welfare ("within the framework of national demographic policies"), but does not make any attempt to reconcile the conflict. Such an attempt was made at the Second Asian Population Conference After declaring the right of couples to decide on spacing and size of their family, and their right to the means to do so, the Conference recognized the social and economic impact of individual family size on societies, and considering it appropriate for Governments to take social and economic measures, in addition to family planning programmes, that will make a smaller family more acceptable and beneficial to the individual couple. However, this is a statement from one region only. This value reconciliation has not been considered at the global level.

61. With regard to freedom of movement on the other hand, most States have already moved to curb individual freedom of movement and to regulate international flows of migrants There is no legislation calling for greater freedom of movement and no concern expressed that freedom of movement be increased at perhaps the cost of some level of public welfare in the receiving country (assuming incoming labour would lower wages, or involve training and transportation costs).

62. Obviously, consideration of measures to influence population variables involves a number of trade-offs. Many conflicts occur in measures to deal with growth problems. For instance, some groups consider that unrestricted exercise of individual freedom to reproduce will lead to larger families, thereby interfering with larger welfare and the range of options available to future generations Some advocate that current individual procreative freedom should be curtailed to enhance the current collective welfare and possibly future individual freedom (assuming projected population growth would decline as a result of public intervention). Similarly, it is argued that unrestricted freedom of internal movement leads to the accumulation of unskilled manpower in cities, infringing on collective welfare, even threatening survival. Restriction of such movement is advocated.

63 Some ecologists and environmental groups go further and argue that unrestricted procreative freedom leads to rapid population growth, threatening over-all survival They advocate subordination of procreative freedom to ensure better chances of survival. National minority groups have been known to oppose implementation of voluntary family planning programmes and voluntary migration opportunities, fearing adverse effects on their group survival In effect, they would trade off individual freedom in favour of group survival.

64. These examples illustrate some obvious situations in which values conflict in policy alternatives. In the case of the World Population Plan of Action, a clearer picture of the relative importance to international bodies of the values involved would help in policy choices. Definition of population problems and of the values to be served by policies to influence those problems would be useful as guidelines to States Members in making future policy choices.

Implicit guidelines

65. Discussion on implementation of guidelines for population policies has not included reference to an implicit guideline for policy formation—that of truthfulness by Governments—truthfulness in relating the real intent of policies, and concern for information on potential impacts, both intended and unintended, of policies.

66 With respect to population policy, there is a growing body of demographic-economic research which indicates that a wide range of socio-economic measures have demographic consequences These measures include raising the age at marriage, raising the level of education for men and women, female labour force participation (all affecting fertility), location of industry, use of capital *versus* labour-intensive technologies affecting population distribution. United Nations instruments recognize the right of women to equality with men, the right of the child to education, the right to freedom from hunger and to liberty of movement They advocate a minimum age at marriage They recognize these measures as desirable ends in themselves, desirable for their contribution to the enhancement of individual freedom Yet, research indicates that in addition to enhancing freedom, they should also be considered on their demographic merits If States employ such policy alternatives for their supposed demographic ends, do they also have an ethical obligation to state the demographic objective underlying the selection of the policy alternative? This question may be particularly important if freedoms are curtailed, or measures distributed unfairly. It is not as yet dealt with in international instruments

67. The second issue relating to truthfulness is the obligation of States to base the adoption of measures on the best available scientific information of their consequences—both intended and unintended Governments have a responsibility to test such measures and inform themselves and their people of the demographic and social consequences This is a relevant issue for instance with regard to education and infant mortality programmes. While desirable in themselves, their desirability may increase because of their anticipated future demographic impact However, little is yet known of the practical mechanisms by which these measures actually influence fertility. Similarly, with regard to population distribution, the mechanism that induces people to move is not sufficiently understood to translate it into strategies to influence such distribution into more socially useful directions Furthermore, the full range of consequences of such measures is not always clear. They may be ethical as well as social, economic and demographic. Ethical considerations are particularly important in relation to the use of

economic incentives to induce participation in fertility reduction programmes. Thus, international standards for population policies should encourage Governments to inform themselves on the mechanisms and consequences of population measures before employing them on a widespread basis.

Implications for the World Population Plan of Action

68. This paper has examined the development of universal guidelines for population policies based on international values recognized in the Charter of the United Nations. In summary, it has been found that little explicit attention has been paid in international instruments to such guidelines for population policies, with the exception of freedom to plan families. The ever-present problem of reconciling conflicting values has also received little attention. This section summarizes possible next steps which might be taken at the international level to recognize, clarify and implement such standards.

69. With respect to valuation of individual freedom, several clarifying steps might be taken. States Members have already reached some consensus on parents' rights to decide "freely and responsibly" the size and spacing of their families and on States' obligations to assist them to do so. However, the question whether States have these obligations regardless of larger demographic objectives has yet to be resolved. Other measures might be suggested to achieve these larger goals, such as reducing mortality or recruiting international migrants to promote population growth. Furthermore, better definition is needed of family planning services to be provided, to include means to promote as well as to regulate fertility. Whether the latter includes abortion and sterilization services is also a question to be considered.

70. The Plan of Action may also wish to expand the concept of reproductive freedom beyond that of family planning to include consideration of maintenance and expansion of ranges of alternatives to reproduction open to couples. Emphasis might be placed on the idea of large families as a problem of restricted choice. If Governments adhered fully to ideals of free choice and full exercise of human rights set forth in the Universal Declaration of Human Rights, this positive effort to enhance human freedom could of itself significantly affect fertility levels, since a number of these measures have been related empirically to declining fertility trends. Measures consistent with this view would include children receiving the education to which they are entitled in the Declaration on the Rights of the Child, equal status for men and women, employment of productive labour and encouragement of a minimum marriage age.

71. Advocacy of expanded individual freedom should not overlook the possibility of value conflicts with collective welfare. The problem of reconciling social needs with individual freedom needs to be addressed. Coercion of reproductive behaviour clearly is not acceptable under the terms of the Charter of the United Nations. Guidelines need to be developed which define and include such measures as use of public education, persuasion and feedback to individuals about the social and personal consequences of their actions, consistent with the ideal of expanding freedoms. Underlying this is the idea that people who understand the advantages of changing their behaviour, to themselves as well as to society, may be more willing to do so.

72. It may be useful to recommend that States avoid the use of measures directed towards influencing population growth or distribution as substitutes for other measures, particularly distributional measures, necessary to development.

73. With regard to distributional considerations, more attention could be paid to the importance of standards for fairness to be considered in formulating policies on family planning and socio-economic measures to influence fertility, and in formulating such policies to influence internal migration as regional development and location of industry.

74. With regard to the survival criterion, the Plan might also attempt to define more clearly the threat to survival posed by rapid population growth and by rapid movements of populations into cities. An important aspect of the definition will be the time-frame involved. It can be argued that population problems, if removed, would not remove major threats to survival of mankind. Thus, Governments should be careful of infringing on individual freedom, or resorting to coercive measures.

75. With regard to implementation, there are no legally binding pieces of legislation to ensure observation of guidelines discussed. The Conference may wish to make basic statements on guidelines, underlining that important national and international values must be served by policy if they are to be implemented and effective in achieving demographic goals.

76. Practical measures that might be taken include the organization of interregional inquiries into the nature and extent to which these guidelines and others are recognized and incorporated into formulation of national population policies. Further conceptual work is necessary to develop more clearly the international standards. Technical resources should be available from the United Nations to States Members who desire assistance in developing and applying standards. It might be recommended that the United Nations system direct its assistance to programmes upholding these standards, other things being equal.

77. Recommendations might also be made that States Members set up internal population policy review mechanisms. The function of the mechanism would be to screen policies that directly or indirectly influence population variables for their internal consistency and to ensure they shall not be coercive or unfair in impact

and that they shall not obstruct the collective welfare or threaten survival of society or any particular group. Membership in such mechanisms should be interdisciplinary and composed not only of social and legal scientists, but of policy-makers and administrators. Location of such a mechanism might be in a quasi-governmental institution for policy studies, where it would be relatively free of political pressures

ANNEX

International instruments and documents

United Nations General Assembly. International Bill of Human Rights, Universal Declaration of Human Rights Resolution 217 A (III) 10 December 1948.

———— Convention on the Prevention and Punishment of the Crime of Genocide. 260 A (III). 9 December 1948

———— Declaration of the Rights of the Child 1386 (XIV) 20 November 1959

———— Population growth and economic development 1838 (XVII) 18 December 1962.

———— International Covenant on Economic, Social and Cultural Rights, 2200 A (XXI) 16 December 1966

———— Population growth and economic development. 2211 (XXI). 17 December 1966.

———— Declaration on the Elimination of Discrimination Against Women 2263 (XXII). 7 November 1967

————Declaration on Social Progress and Development 2542 (XXIV) 11 December 1969

———— World Population Year, 1970 2683 (XXV)

———— International development strategy for the Second United Nations Development Decade 2626 (XXV) 24 October 1970

———— Programme of concerted international action for the advancement of women 2716 (XXV). 15 December 1970.

———— Economic and Social Council. Work programmes and priorities in population fields 1084 (XXIX) 30 July 1965

———— Work programmes and priorities in the field of population 1486 (XLVIII). 3 April 1970

———— Population and development 1672 (LII). 2 June 1972.

———— United Nations Fund for Population Activities 1763 (LIV) 16 May 1973

———— *Study of discrimination ... right. 1788 (LIV)* 4 June 1973

———— Commission on the Status of Women. Family planning 7 (XVIII). 8 March 1965 (E/4025, Official Records of the Economic and Social Council, Thirty-ninth Session, Supplement No 7).

———— Report of the Asian Population Conference, 1963 United Nations publication, Sales No 65 II F 11

———— Report of the Second Asian Population Conference, 1972 13 December 1972 (E/CN 11/1065).

———— Final Act of the International Conference on Human Rights, Teheran, 22 April-13 May 1968 United Nations publication, Sales No E 68.XIV 2.

———— Economic and Social Council Science and technology and problems of population growth in developing countries Report of the Advisory Committee on the Application of Science and Technology to Development to the Economic and Social Council at its Fifty-second session 21 March 1972 (E/5107).

———— Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972 United Nations publication, Sales No E 73 II A 14

———— Office of Public Information Declaration on population by world leaders, 1966 and 1967. 9 December 1966 (SG/SM/620/Rev 1)

World Health Assembly Concerning maternal and child health WHA 1 43 July 1948

———— Concerning health aspects of world population. 18 49 May 1965

———— Concerning health aspects of population dynamics 21.43 May 1968

ACTIVITIES OF THE UNITED NATIONS SYSTEM IN THE FIELD OF POPULATION

United Nations Secretariat *

1. The main aim of this paper is to provide Governments and participants at the World Population Conference with a concise and readily usable review of the population activities currently being carried out by the United Nations and its specialized agencies. In addition, the paper records the highlights of the major legislative decisions, that is, the broad policy directives under which these activities take place. Since the Conference deliberations—and any plan of action that may emerge from the Conference—will clearly affect the course and content of the future activities of the United Nations system, it was deemed desirable to have on hand this "bench-mark" of the nature and scope of the system's activities on the eve of the Conference.

2. A distinctive feature of this paper is its focus on the United Nations system, taken as a whole, rather than on the programmes of individual organizations. It should be read in conjunction with the companion background paper, on the role of international assistance, [1] prepared by the United Nations Fund for Population Activities (UNFPA). That paper covers, in addition, the broad range of international activities being carried out by non-governmental organizations and institutions, and by individual Governments through bilateral programmes.

3. The present paper was prepared by the United Nations, in co-operation with the organizations concerned, and reviewed and approved by the Administrative Committee on Co-ordination. [2]

LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

Legislative framework

4. The competence of the United Nations system to promote action in the field of population derives fundamentally and in a very general sense from the Charter of the United Nations and the constituent instruments of the specialized agencies. It was defined more specifically in the provisions of the International Development Strategy for the Second United Nations Development Decade. This Strategy, adopted by the General Assembly on 24 October 1970, comprises a statement of goals and objectives agreed by the world community, and an outline of policy measures which Governments resolved to adopt and implement during the 1970s. The section of the Strategy relating to human development declares:

> "Those developing countries which consider that their rate of population growth hampers their development will adopt measures which they deem necessary in accordance with their concept of development. Developed countries, consistent with their national policies, will upon request provide support through the supply of means for family planning and further research. International organizations concerned will continue to provide, when appropriate, the assistance that may be requested by interested Governments. Such support or assistance will not be a substitute for other forms of development assistance." [3]

5. The targets contained in the Strategy with respect to a minimum annual gain in real gross production of 6 per cent and a *per capita* gain of 3.5 per cent for developing countries imply at least a lowering of the annual rate of population growth from the 2.8 per cent forecast for the 1970s to 2.5 per cent. "In this context", the Strategy states, "each developing country should formulate its own demographic objectives within the framework of its national development plans". [4]

6. It should, perhaps, be recalled at this point that the relationship between population and development has been a concern of the United Nations since its inception. The Economic and Social Council established the Population Commission as one of its functional commissions as long ago as 1946. In the same year, a Population Division was established in the Department of Economic and Social Affairs of the United Nations Secretariat, as the substantive arm of the Commission. The Commission's terms of reference, as approved by the Economic and Social Council on 10 August 1948, [5] were to arrange for studies and advise the Council on:

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* Population Division of the Department of Economic and Social Affairs.

[1] United Nations Fund for Population Activities, "Role of international assistance in the population fields", *Population Debate*, vol. II, part nine.

[2] The Administrative Committee on Co-ordination is composed of the executive heads of all United Nations organizations and meets under the chairmanship of the Secretary-General of the United Nations.

[3] General Assembly resolution 2626 (XXV) of 24 October 1970, para. (65).

[4] *Ibid.*, para. (15).

[5] See resolution 150 (VII). The membership of the Population Commission consists of experts nominated by the

(Continued on next page)

(a) The size and structure of population and the changes therein;

(b) The interplay of demographic factors and economic and social factors;

(c) Policies designed to influence the size and structure of population and the changes therein;

(d) Any other demographic questions on which either the principal or the subsidiary organs of the United Nations or the specialized agencies may seek advice. These terms of reference have never had to be changed, their broad scope having enabled the Population Commission to respond to the dramatic changes that have occurred over the past 25 years in the world demographic situation, and to the consequent shifts of emphasis in the research and field activities of the United Nations system in the population sphere.

7. Another of the Council's functional commissions —the Statistical Commission—has worked closely with the Population Commission, because of their mutual interests in demographic and related statistics [6] Other functional commissions of the Economic and Social Council with an interest in various facets of population include the Commission for Social Development, the Human Rights Commission and the Commission on the Status of Women

8. While the Economic and Social Council has discussed periodically population questions when reviewing the reports of its Population Commission, the General Assembly, prior to the adoption of the Strategy, addressed itself specifically to population problems on only two occasions, in 1962 and 1966. In December 1962, the Assembly concluded its first full-scale debate on the matter by formally recognizing the close relationship which existed between economic development and population growth, and resolving that the United Nations should encourage and assist Governments "in [illegible]

9. The subsequent action of the General Assembly in 1966 can best be understood in the light of important developments that had occurred in the intervening four years. One such development was the concern aroused in the international community by the conclusions of a Secretariat study of world population projections showing that population in developing regions would, under the medium assumption, more than double between 1965 and the year 2000 Deep concern over the rapid growth in population and its disturbing consequences for development was also registered by the Asian Population Conference in 1963, an intergovernmental Conference convened by the United Nations Economic Commission for Asia and the Far East (ECAFE). Similar concerns were reflected in the discussions of the Second World Population Conference, held at Belgrade in 1965, and in the Declaration on Population Growth and Human Dignity and Welfare, signed by several Heads of State of both developing and developed countries, and issued by the Secretary-General on Human Rights Day on 10 December 1966. [8] Important decisions reflecting these preoccupations were also taken during 1965-1966 in both the World Health Organization (WHO) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) Thus, four years after its first full-scale debate on the subject, the General Assembly, on 17 December 1966, unanimously approved resolution 2211 (XXI) on "population growth and economic development", an event widely heralded as a turning-point in the role being played by the United Nations system with respect to population problems.

10. This resolution embodied the consensus reached by States Members with regard to the seriousness of population problems and the need for gaining a proper understanding of the effects of those problems on economic and social development It also emphasized the necessity for accelerated action to implement the expanded programme recommended by the Population Commission in 1965 and endorsed by the Economic and Social Council. [9] It provided that the United Nations and the specialized agencies "should assist, when requested, in further developing and strengthening national and regional facilities for training, research, information and advisory services in the field of population" Although "advisory services in the field of population" were not specifically defined, the tenor of the debate and the various provisions of this resolution clearly signalled the departure from existing restrictions with respect to United Nations technical assistance projects in the field of population In taking the fore-

Governments of the countries elected by the Economic and Social Council to serve on the Commission The number of [illegible]

[illegible] Council in promoting the development of national statistics (including demographic statistics) and their international comparability, and the improvement of statistics and statistical methods in general, and in developing the statistical services of the Secretariat

[7] General Assembly resolution 1838 (XVII) of 18 December 1962

[8] In the declaration the Heads of State affirmed the [illegible] the size of their families and the conviction that the enrichment of human life is the objective of family planning The 12 original signatories were: Colombia, Finland, India, Malaysia, Morocco, Nepal, Republic of Korea, Singapore, Sweden, Tunisia, United Arab Republic of Egypt, and Yugoslavia A year later the leaders of 18 other countries—Australia, Barbados, Denmark, Dominican Republic, Ghana, Indonesia Iran, Japan, Jordan, Netherlands, New Zealand, Norway Pakistan, the Philippines, Thailand, Trinidad and Tobago United Kingdom of Great Britain and Northern Ireland, a the United States—added their signatures to this Declaration and presented it to the Secretary-General on Human Right Day in 1967.

[9] In resolution 1084 (XXXIX), adopted in July 1965, th Economic and Social Council had, for the first time, specif ically called upon the Secretary-General "to provide . advisory services and training on action programmes th field of population at the request of [illegible] ernment r assistance in this field".

going steps, the Assembly recognized "the sovereignty of nations in formulating and promoting their own population policies, with due regard to the principle that the size of the family should be the free choice of each individual family".

11. This action by the General Assembly and, more particularly, its appeal to the United Nations and the agencies to strengthen the assistance they were giving Governments in this area was followed by decisions of the governing and legislative bodies of the specialized agencies to extend and to intensify their contributions in this sphere, within the framework of their special areas of competence.

12. The World Health Organization, which had already taken important policy decisions in 1965 and 1966 on the health and medical aspects of population problems, saw its population mandate further broadened by decisions of the World Health Assembly in 1967, 1968 and 1969. By these decisions, the Assembly affirmed the responsibility of WHO to provide advisory services to Governments, at their request, on health aspects of fertility, sterility and fertility regulation methods, including the organization of family planning services as part of organized health services, particularly their maternal and child health components. Recently, the World Health Assembly has noted "with satisfaction the increasing assistance given by WHO to Governments to further develop their health infrastructure for the provision of family planning care . . ." and urged that WHO "intensify its leadership role in the medial and health aspects of family health, in collaboration with UNICEF and UNFPA as well as with other appropriate organizations within and outside the United Nations system". [10]

13. Since 1967, the United Nations Children's Fund (UNICEF) has likewise been empowered by its Executive Board to support family planning projects as part of its maternal and child health services, in so far as such projects were requested by Governments. This mandate was further broadened in succeeding sessions to permit UNICEF to provide assistance to the motivational, educational and social aspects of family planning.

14. In the same year, the Conference of the Food and Agricultural Organization of the United Nations (FAO) recommended that ". . . the Director-General increasingly involve the organization in the study of the food/population dilemma"; and considered that home economics and agriculture, through their established extension programmes, specialized programmes for women and youth and applied nutrition, provided "excellent channels" to reach the family. The Conference recognized the need to help families achieve, through appropriate policies and programmes, conditions that would increase well-being and would contribute to national development, and agreed that education and training activities in support of these national programmes, through better utilization of resources and improved nutrition, were within the competence of FAO. Accordingly, it recommended that on Government request, FAO be prepared to provide assistance in the organization of educational programmes directed to helping populations in their search for well-balanced family life. [11] More recently, the Conference has emphasized the role of FAO in integrating population aspects into existing food and agricultural policies and programmes, and has authorized the examination of the population implications of all FAO programmes. [12]

15. Following important decisions taken by its General Conference and Executive Board in 1966 and 1967, respectively, the United Nations Educational, Scientific and Cultural Organization was given a detailed mandate in the population field by the General Conference in November 1968. [13] The over-all purpose of the UNESCO population programme, as defined in this and subsequent resolutions and recommendations [14] of the General Conference, is to improve knowledge and to increase awareness of the causes and consequences of population change, of their interrelations with other aspects of social, cultural and environmental change, and of their implications for human rights and the quality of life. The programme thus involves activities in education, as well as communications and the social and natural sciences.

16. The International Labour Conference, at its fifty-first session in June 1967, adopted a resolution highlighting the influence of rapid population growth on opportunities for training and employment and on the welfare of workers, and outlining the role to be played by the organization in this regard. The following year, the Governing Body of the International Labour Organisation (ILO) endorsed the following lines for action by the ILO in population fields:

(*a*) Promotion of information and educational activities on population and family planning questions at various levels and particularly through workers' education, labour welfare and co-operative and rural institutions' programmes;

(*b*) Policy-oriented research on the demographic aspects and measures of social policy in certain fields, such as employment and promotion of social security;

(*c*) Action to stimulate participation by social security and by medical services at enterprise level in promotion of family planning.

17. The decision of the International Bank for Reconstruction and Development (World Bank) to enter the population field dates back to 1968. It was based

[10] World Health Assembly, resolution 26.49 of 22 May 1973.

[11] Food and Agriculture Organization of the United Nations, *Report of the Fourteenth Session of the Conference*, Rome, 4-23 November 1967, paras. 260 and 367.

[12] Approved FAO Programme of Work, 1974-75, pp. 75-78.

[13] Resolution 1.241 of the *Fifteenth Session*.

[14] See, in particular, resolution 7.25 of the Sixteenth Session (1970) and recommendation 7.4 of the *Seventeenth Session* (1972) of the General Conference of the United Nations Educational, Scientific and Cultural Organization.

on the Bank's conviction that too rapid population growth was a major barrier to the economic and social progress of most of its member countries. The World Bank (including its affiliate, the International Development Association (IDA)) has extended conventional "Bank" and "soft loan" assistance to the population sector, and its commitments for population activities have since steadily grown and by the end of 1973 had reached $71 million.

18. In the United Nations itself, following the adoption by the General Assembly of resolution 2211 (XXI) of 17 December 1966, the Secretary-General announced his decision to establish a Trust Fund for voluntary contributions by Governments, institutions and individuals to supplement the limited resources available to the United Nations under its regular budget and the United Nations Development Programme (UNDP), in order to obtain the resources needed to tackle the expanded programme of population activities that had been called for by the General Assembly

19. In May 1969, responsibility for the administration and management of the Fund was transferred to the Administrator of the United Nations Development Programme, and the Fund was renamed the United Nations Fund for Population Activities. At the same time, the scope of population activities which the Fund could support was expanded to include fields of concern to other organizations in the United Nations system and to appropriate non-governmental organizations The Fund was authorized, in principle, to provide all forms of assistance that might be required, including even those not normally considered to fall within the range of multilateral technical co-operation

20 In December 1972, the General Assembly put the Fund under its own authority and designated the UNDP Governing Council as the Fund's governing body. The Economic and Social Council, in May 1973, defined the aims and purposes of UNFPA to be:

(*a*) To build up, on an international basis, with the assistance of the competent bodies of the United Nations system, the knowledge and the capacity to respond to national, regional, interregional and global needs in the population and family planning fields; to promote co-ordination in planning and programming; and to co-operate with all concerned;

(*b*) To promote awareness, both in developed and in developing countries, of the social, economic and environmental implications of national and international population problems, of the human rights aspects of family planning, and of possible strategies to deal with them, in accordance with the plans and priorities of each country;

(*c*) To extend systematic and sustained assistance to developing countries at their request in dealing with their population problems; such assistance to be afforded in forms and by means requested by the recipient countries and best suited to meet the needs of the individual country;

(*d*) To play a leading role in the United Nations system in promoting population programmes, and to co-ordinate projects supported by the Fund.[15]

21. Pursuant to this mandate, the Fund has been orienting its activities increasingly towards responding directly to requests from Governments for assistance on comprehensive country projects However, during these initial years of its operation, the Fund has also been able to contribute substantially to the newly expanded activities of the specialized agencies and to the progressive involvement in the population field of United Nations regional bodies

22. Although most of the regional economic commissions were already involved in demographic work at the end of the 1950s, the development of significant population activities at the regional level may be said to have begun only in the late 1960s A notable exception is the Asian region, where concern about population and its impact on development has been evident since the inception of ECAFE in 1947. This long-standing interest was given new impetus in 1964, when the Commission, as the aftermath of the first Asian Population Conference, approved resolution 54 (XX), generally regarded as the first "action-oriented" resolution on population matters adopted within the system Even within ECAFE, however, the formulation of a large-scale regional programme to reflect the special economic and social problems of a region which comprises more than half of the world population had to wait until 1968 [16] Recently, the Second Asian Population Conference has recommended a further strengthening and expansion of the role of ECAFE as the focal point for all population activities within the region

23. An expanded population programme for the African region was adopted in 1969 The following year, the United Nations Economic Commission for Africa (ECA) approved the establishment of a biennial Conference of African Demographers [17] to review this programme, and called for a comprehensive study "of population levels and trends in relation to economic and social development" within the region

24. The main elements of the population work programmes of the United Nations Economic Commission for Europe (ECE), Economic Commission for Western Asia (ECWA) and Economic Commission for Latin America (ECLA) are described in the next section and need not be outlined here As far as ECLA is concerned, however, reference should be made here to resolution 304 (XIV), adopted by the Commission in 1971, which formalized the long-standing collaboration between ECLA and Centro Latinoamericano [illegible] Demografía (CELADE) by recognizing CELADE as [illegible] autonomous agency under its aegis, and urging [illegible]

[illegible] (LIV) [illegible] Nat[illegible]

[illegible] 1968 [illegible] in

[illegible]

Centre to continue its teaching and research activities and the provision, on request, of demographic services on population to Latin American countries.

25. This brief summary of key legislative developments may conclude with some mention of the Economic and Social Council's most far-reaching action to date. In 1972, on the recommendation of its Population Commission, the Council urged member States, *inter alia:*

(*a*) To give full attention to their demographic objectives and measures to achieve the goals of the Second United Nations Development Decade and to improve demographic statistics, research and planning machinery for developing population policies and programmes;

(*b*) To co-operate in achieving a substantial reduction of the rate of population growth in those countries which consider their current rate of growth too high and in exploring the possibility for setting of targets for such a reduction in those countries;

(*c*) To ensure, in accordance with their policies and needs, that information and education about family planning, as well as the means to practise family planning effectively, are made available to all individuals by the end of the Second United Nations Development Decade.[18]

Other provisions of this resolution dealt with the World Population Conference and the World Population Year, and called for placing a draft World Population Plan of Action on the agenda of the World Population Conference.

Institutional framework

26. Within the United Nations system of organizations, those with specific roles in the field of population include, as has already been indicated, the United Nations, WHO, FAO, UNESCO, the ILO and the World Bank. Within the United Nations, several separate units of organizations may be singled out, i.e., the Population Division of the Department of Economic and Social Affairs, UNFPA, UNICEF, and the five regional economic commissions (ECA, ECAFE, ECE, ECLA and ECWA[19]). The five demographic and training centres serving the different regions of the world must also be mentioned. Lastly, the United Nations Industrial Development Organization (UNIDO) and the newly created United Nations Environment Programme (UNEP) also have a growing interest in population problems.

[18] Economic and Social Council resolution 1672 (LII). The basic right of parents to determine the number and spacing of their children and of access to adequate information to practise that right was previously affirmed by a proclamation adopted at the International Conference on Human Rights, held at Teheran in 1968 (see *Final Act of the International Conference on Human Rights* (United Nations publication, Sales No. E.68.XIV.2), chap. II, para. 16); and by the Declaration on Social Progress and Development adopted by the General Assembly in 1969.

[19] Formerly the United Nations Economic and Social Office in Beirut (UNESOB).

27. In the United Nations Secretariat, the Population Division, as the counterpart of the Population Commission, provides the substantive services required of the Secretariat in carrying out the programme recommended by the Population Commission. The Division's work programme has the following components: population statistics and population projections; studies and research in fertility, mortality and morbidity, migration and urbanization, and interrelations between population and economic and social development; population policies; family planning; and training and other educational activities supporting population work. In the crucial area of population statistics, the Division collaborates with the United Nations Statistical Office, which is responsible for the promotion and improvement of demographic statistics.

28. At the regional level, the economic commissions for Africa, for Asia and the Far East, and for Western Asia each has a separate population division or section. In the European region, population work is carried out within other divisions. Recently, however, a special population team has been established to carry out a number of studies in this area. In the Latin American region, CELADE performs certain functions which in the other regions are carried out by the regional economic commissions. Recently, a joint ECLA/CELADE division has been established within the ECLA secretariat. The regional work programmes are established by the regional units in consultation with the Population Division at Headquarters. The Population Commission receives periodic reports from these regional bodies, and from the United Nations organizations concerned, on their work programmes in the field of population. In accordance with arrangements worked out at the intersecretariat level, the Commission, for the first time in 1973, received this information in the form of one comprehensive report covering the activities of the entire system (E/CN.9/284).

29. Reference has been made in the preceding section to the origins and establishment of UNFPA. The secretariat of the Fund, headed by an Executive Director, has the continuing functions of formulating policies and plans for the organization, conducting its external relations, promoting population programmes and building capacity in the United Nations system and elsewhere to respond to population needs. In January 1974, the Governing Council of UNDP approved a reorganization of the UNFPA secratariat and the establishment of two new units, a Programme Planning Division and a Project Division, which have been assigned the functions of discharging the operational functions of UNFPA relating to programme and project development, assessment and implementation. At the field level, UNFPA has a network of co-ordinators to assist Member States in the development of projects to be supported by the Fund. The UNFPA receives advice from and consults with the specialized agencies through an Interagency Consultative Com-

mittee (see para. 34) and seeks technical and expert advice from *ad hoc* technical groups.

30. Separate units dealing with population have recently been established in many of the specialized agencies. In WHO, the Division of Family Health is entrusted with the functions of developing and administering programmes concerned with the development of services, education and training and research [illegible]

WHO headquarters interested in population (such as the Health Statistics Division, the Division of Strengthening of Health Services and the Health Manpower Division) and with WHO regional offices and country representatives The World Bank has two specialized units dealing with population; the Population and Nutrition Projects Department, which is an operating unit engaged in preparing and monitoring population projects, and the Population and Human Resources Division of the Development Economics Department, whose primary focus is research and policy work Similarly, in UNESCO, a Population Co-ordination and Research Unit has been established within the Social Science Department. In addition to substantive responsibilities for social science research, the Unit has been entrusted with over-all planning and both external and internal co-ordination functions

31. The institutional arrangement of the (ILO) and FAO is somewhat different. In the ILO, a population focal point has been established in the Technical Co-operation Department, with the functions of providing an over-all view of the ILO interests in this field, and of promoting the development and co-ordination of its UNFPA-assisted programme; as a general rule, however, the ILO specialists within the various technical units and in the regions are responsible for implementing population activities within their fields of competence. In FAO, the function of advising the organization on the development of policies and programmes is carried out by an Interdepartmental Working Group on Population, serviced by a population programme co-ordinator and chaired by the Head of the Economic and Social Policy Department, where FAO population work is mostly centred.

Machinery to ensure system-wide co-operation

32. Substantive programme co-ordination between the United Nations and the specialized agencies is ensured. (*a*) by senior staff of the organizations concerned, who, *inter alia*, exchange and comment on one another's programmes of work in advance of their consideration by legislative bodies, and (*b*) by informal meetings at the working level on various technical aspects of the work requiring intersecretariat co-operation.

33. In 1967, the Administrative Committee on Co-ordination established as part of its continuing machinery a new subsidiary body—the Sub-Committee on Population—with the function of co-ordinating and harmonizing the population programmes carried out within the system. The Sub-Committee has met annually under the chairmanship of the Director of the Population Division of the United Nations Secretariat, and has been attended by the officials dealing with population in WHO, FAO, UNESCO, the ILO, the World Bank, UNICEF, and the regional economic commissions, and by representatives of UNFPA In 1972, the Sub-Committee's parent body, the Administrative Committee on Co-ordination, reported to the Economic and Social Council on the shift of emphasis that was taking place in the Sub-Committee's work from an initial preoccupation with the harmonization of mandates, to the systematic examination of programmes, and of the co-operative measures required to ensure their effective implementation.

34 This emphasis on programme co-ordination is also reflected in the activities of the Inter-Agency Consultative Committee of UNFPA, which has the function of over-viewing and ensuring intersecretariat co-operation with respect to UNFPA-supported activities. The meetings of this Committee, usually held in conjunction with the Administrative Committee's Sub-Committee on Population, are chaired by the Executive Director of UNFPA

Main activities of the United Nations system in the population field

35 The following summary of the principal activities being carried out by the various organizations in the United Nations system provides in a concise and easily digestible form, the "bench-mark" referred to in the introduction. Participants wishing a more detailed and comprehensive account of the programmes of individual organizations will find it in the interagency programme report submitted to the Population Commission at its seventeenth session (E/CN 9/284) Moreover, the functional structure of this chapter has made it difficult to do full justice to the role and activities of UNFPA, whose operational and financing activities, carried out in co-operation with other United Nations organizations, cut across the five functional programme areas singled out below. A fuller description of the role of UNFPA will be found in the companion paper prepared by the Fund for the Conference [20]

36. The five major programme areas are.

(*a*) Population statistics and projections,

(*b*) Population studies and research;

(*c*) Population policies;

(*d*) Family planning;

(*e*) Training and other educational activities supporting population work.

Tables 1-3, showing the expenditures of the United Nations system in the field of population, are given below.

[20] "Role of international assistance in the population fields" *loc cit*

Centre to continue its teaching and research activities and the provision, on request, of demographic services on population to Latin American countries.

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(*a*) To give full attention to their demographic objectives and measures to achieve the goals of the Second United Nations Development Decade and to improve demographic statistics, research and planning machinery for developing population policies and programmes;

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34. This emphasis on programme co-ordination is also reflected in the activities of the Inter-Agency Consultative Committee of UNFPA, which has the function of over-viewing and ensuring intersecretariat co-operation with respect to UNFPA-supported activities The meetings of this Committee, usually held in conjunction with the Administrative Committee's Sub-Committee on Population, are chaired by the Executive Director of UNFPA

Main activities of the United Nations system in the population field

35. The following summary of the principal activities being carried out by the various organizations in the United Nations system provides in a concise and easily digestible form, the "bench-mark" referred to in the introduction. Participants wishing a more detailed and comprehensive account of the programmes of individual organizations will find it in the interagency programme report submitted to the Population Commission at its seventeenth session (E/CN 9/284) Moreover, the functional structure of this chapter has made it difficult to do full justice to the role and activities of UNFPA, whose operational and financing activities, carried out in co-operation with other United Nations [illegible]

prepared by the Fund for the Conference [20]

36. The five major programme areas are

(*a*) Population statistics and projections,

(*b*) Population studies and research;

(*c*) Population policies;

(*d*) Family planning;

(*e*) Training and other educational activities supporting population work.

Tables 1-3, showing the expenditures of the United Nations system in the field of population, are given below.

[20] "Role of international assistance in the population fields", *loc. cit.*

TABLE 1. POPULATION EXPENDITURES, BY ORGANIZATION AND SOURCE, 1972-1974

(Thousands of dollars)

	1972			1973			1974[a]		
	Regular budget funds	*Extra-budgetary-funds*[b]	*Total*	*Regular budget funds*	*Extra-budgetary funds*[b]	*Total*	*Regular budget funds*	*Extra-budgetary funds*[b]	*Total*
United Nations[c]	1,980	3,972	5,952	2,696[d]	7,131	9,827	4,968[e]	14,139	19,107
ILO	254	735	989	362	1,897	2,259	480	3,500	3,980
FAO	164	410	574	354	1,016	1,370	322	1,526	1,848
UNESCO	28	—	28	285	2,269	2,554	388	3,781	4,169
WHO	110	6,264	6,374	1,910	14,081	15,991	2,108	19,441	21,549
UNICEF	—	2,371	2,371	—	3,711	3,711	—	6,000	6,000
TOTAL	2,536	13,752	16,288	5,607	30,105	35,712	8,266	48,387	56,653

SOURCE: For 1972, "Report of the Administrative Committee on Co-ordination on expenditures of the United Nations system in relation to programmes" (E/5359).

[a] Estimates.

[b] Received mainly from the United Nations Fund for Population Activities.

[c] Including United Nations regional economic commissions.

[d] Including expenditure of $612,906 for World Population Conference and $286,192 for the CESI information component of the World Population Year.

[e] Including funds available to the amount of $978,920 for World Population Conference and $348,591 for the CESI information component of the World Population Year.

TABLE 2. EXPENDITURES OF UNITED NATIONS FUND FOR POPULATION ACTIVITIES, 1972-1974

(Thousands of dollars)

1972	*1973*[a]	*1974*[a]
21,000	32,000	49,000

[a] Estimate.

TABLE 3. WORLD BANK GROUP FINANCING,[a] 1972-1974

(Thousands of dollars)

1972	*1973*	*1974*[b]
34,000	27,000	42,000

[a] International Development Association credits and World Bank loans. Excluding administrative and operational expenditures.

[b] Estimate.

Population statistics and projections

Population statistics

37. Efforts to improve demographic statistics by the United Nations Statistical Office in collaboration with other organizations of the United Nations system involve two general types of programmes: the development and improvement of national systems of demographic statistics; and the world-wide dissemination of national statistics in as comparable form as possible.

38. Activities under the first type of programme provide variously for the formulation of common standards relating to types of data to be collected and the methods of their collection, processing, classification and presentation; the preparation of technical manuals and handbooks designed to aid national statistical services in implementing the standards; direct assistance to Governments through seminars, consultations and the provision and supervision of qualified field experts; and provision for training of national technical personnel. Subject fields currently covered include population censuses and sample surveys, vital statistics and migration statistics.

39. The United Nations World Population Census Programmes have made a significant contribution to the notable improvement in the quantity and quality of national census data which has taken place during the past 20 years. The goal of the 1970 programme is to have at least one reliable population census held in each country of the world between 1965 and the mid 1970s, providing data as nearly internationally comparable as possible, in accordance with the United Nations census recommendation.[21] Activities have been directed towards all regions of the world, with particular emphasis currently on the countries of Africa, through the medium of the African Census Programme, funded largely by UNFPA.

40. Development of vital statistics is promoted under the World Programme for the Improvement of Vital Statistics, in which WHO plays a basic role. The goal of this programme is the establishment or revitalization by 1979, in every country of the world, of a vital statistics system capable of producing reliable measures of births, deaths and rates of natural increase, as well as of the other vital data needed for planning economic and social development. Because of the difficulties faced by developing countries in the ultimate achievement of comprehensive civil registration systems, interim measures for meeting their urgent needs for basic data are also provided. The first major step under the programme was the publication of the *Principles and Recommendations for a Vital Statistics System*.[22] Resources are being directed towards the preparation of a handbook of vital statistics methods to supplement

[21] *Principles and Recommendations for the 1970 Population Censuses* (United Nations Publication, Sales No. 67.XVII.3).

[22] United Nations publication, Sales No. 73.XVII.9.

this publication and the direct provision of advice and assistance to Governments.

41. Activities are under way in connexion with migration statistics, beginning with the preparation of recommendations for international and internal migration statistics. Regional bodies and Governments are being consulted, and United Nations recommendations on this matter will probably be issued in 1975.

42. With programmes in the improvement of statistics in the individual fields well under way and with the growing interest in unified approaches to analysis, new programmes will be directed towards the development of statistical presentations that will facilitate the study of the interrelationship between demographic, social and economic factors.

43. Statistics on education, health, employment, crime, cultural activities and the use of leisure, and on the population, are being brought into consistency with one another through common and interacting classifications and socio-demographic accounts being developed by the Statistical Office.

44. Activities in the statistical offices of the regional economic commissions are co-ordinated with those of the United Nations Statistical Office in respect of emphasis. Each of the regional offices is preparing programmes in vital statistics to be put into effect either immediately or, in the case of Africa, as soon as resources can be released from the African Census Programme It is anticipated that regional programmes designed to aid countries in the collection of current statistics will create a situation in which the results of the censuses taken in the 1970 census decade can be updated with greater accuracy than has been possible in the past.

45. The statistical systems of each of the specialized agencies complement and extend the universality of the over-all United Nations system of statistical activities in the population field. The World Health Organization, for example, compiles and disseminates statistics on mortality by cause and on morbidity, as well as statistics related to fertility (pregnancy, prematurity, abortion etc). Collection and analysis of data on urban-rural differences in fertility, mortality and morbidity, as well as in the provision of health services, also form an integral part of WHO statistical activities The International Labour Organisation concentrates on manpower statistics (labour force, employment, unemployment and underemployment), which are published together with a great variety of other labour statistics on a world-wide basis in the ILO *Yearbook of Labour Statistics* and the *Quarterly Bulletin of Labour Statistics* The FAO develops statistics on the population dependent upon agriculture, agricultural labour force and agricultural labour requirements It also promotes the collection of data on farm population and farm employment through the World Censuses of Agriculture, and on interrelationships between population dynamics and agricultural change, through appropriate surveys The UNESCO compiles, analyses and disseminates statistics on education, science, culture and communications.

46. Aggregated national population data collected by questionnaires are being stored in the computer in the International Computer Centre of the United Nations. The utility of these data for research will be enhanced by permitting access to the data files at shorter intervals and by making possible computation of a variety of rates and ratios required for analysis. Long-range plans for extending types of data available and improving their comparability envisages assembling duplicates of national tapes. Computerized data banks and automated information systems are also being developed by WHO and the ILO for their respective statistical systems

47. A continuing function of the United Nations system is the evaluation of the accuracy and consequent adjustment of basic demographic data provided by Governments particularly on the age and sex structure of population and on fertility, mortality and international migration Such evaluation and adjustment must precede any use of these data for making projections or in comparative studies. Much of this work is carried out by the Population Division in collaboration, in so far as possible, with the regional economic commissions and the research and training centres sponsored by the United Nations The adjusted data is made available for the use of organizations in the United Nations system Attention is also given by the specialized agencies to the improvement of the adequacy and international comparability of the statistics in their respective fields

48. An ancillary international programme in which the United Nations is participating and that will add considerably to the available statistics on fertility throughout the world is the World Fertility Survey. This Survey is being undertaken by the International Statistical Institute in co-operation with the International Union for the Scientific Study of Population (IUSSP) and other organizations with the collaboration of the United Nations and the financial support of UNFPA and the United States Agency for International Development (USAID) The Survey is in the planning stage with the implementation scheduled for the period from 1 July 1974 to 30 June 1977. Its aim is to provide scientific information which would enable each country to describe and interpret its situation with regard to human fertility and to help compare fertility levels and the factors that influence them in different countries and regions.

49. The most comprehensive sources of world-wide population statistics are the United Nations *Demographic Yearbook* and the United Nations *Statistical Yearbook*. More current population statistics are published in the United Nations *Monthly Bulletin of Statistics* and the quarterly *Population and Vital Statistics Report*.

Population projections

50 One of the objectives of the population estimates

and projections programme is to provide the United Nations, the specialized agencies, Governments, other institutions and the general public with estimates and projections of the total population of countries, regions and the world and its structure by age and sex, urban and rural sectors, and households and families. Another objective is to analyse the future trends and their implications for requirements for food, housing, education, employment, health etc. The projections of total population by sex and age prepared by the United Nations are the basis for other demographic projections, such as the labour force projections prepared by the ILO, projections of the economically active persons in agriculture and of the agriculturally dependent population prepared by FAO, and country projections of age-specific education enrolment ratios, by sex and level prepared by UNESCO. The programme of work in population estimates and projections is carried out in collaboration with the regional economic commissions, regional demographic centres and in co-ordination with the specialized agencies.

51. The United Nations is currently revising the projections of total population by age and sex to the year 2000, on the basis of data from the 1970 round of population censuses and of other new data and information acquired since the revision based on the 1968 assessment was completed. These revisions will then be used by the specialized agencies to prepare corresponding revisions in their demographic, labour force and education enrolment projections. Work is also in progress on the revision of projections of rural, urban and big-city population, to be followed by urban and rural population projections by sex and age.

52. During the past few years, there has been increasing public interest in the long-range projections of the world population beyond the year 2000. Accordingly, and with particular reference to the needs of the United Nations symposia on Population and Development held at Cairo in June 1973; and on Population, Resources and Environment, held at Stockholm in September-October 1973, provisional population projections extending to the end of the twenty-first century and beyond have been prepared for the more developed and less developed regions of the world and for the eight major areas. The basic frame of reference is the stabilization of population growth, which is assumed to be eventually achieved in each area. The results of these long-range speculative projections have been issued as a chapter in a background paper for the 1974 World Population Conference.[23]

53. The work on population, labour force, educational and agricultural population projections is carried on as a system-wide co-ordinated activity through the Sub-Committee on Population of the Administrative Committee on Co-ordination (see para. 33). This is necessary to assure the consistency of the various types of demographic projections with the underlying United Nations projections of total population by sex and age. At the working level, agreement is reached by an inter-agency working group of specialists which meets periodically to review the basic methodologies and assumptions underlying the projections.

54. Population and related projections recently published include the following: *World Population Prospects as Assessed in 1968*;[24] *Growth of the World's Urban and Rural Population, 1920-2000*;[25] *"Projection of world agricultural population"*;[26] *Labour Force Projections, 1965-1985.*[27]

Population studies and research

55. The work of the United Nations system in the field of population is based on the premise that "population change" is not an independent variable but one closely associated with economic and social development, and that a deeper and more universal understanding of the determinants of population trends and their consequences in relation to human welfare and development will foster that development.[28] The thrust of the population research and studies programme is to identify and analyse the factors involved in population growth and distribution and to investigate the interrelationship between population and development. The fields selected for research are those named as priority areas by the Population Commission and the programme of work in each area is designed to produce knowledge essential to policy considerations or to the support of technical assistance requested by Governments. They are also areas of research that are likely to be important to whatever world population plan of action may emerge from the World Population Conference.

Fertility, mortality and morbidity

Fertility

56. The objectives of the system's programme of research in fertility are to analyse fertility levels and trends, factors affecting them and their consequences, particularly to developing countries, in order to assist Governments to broaden their knowledge and develop such national objectives in the area of fertility as they consider appropriate in the light of their circumstances.

57. The research is directed towards identifying the regions and population subgroups with high fertility and the particular features of their fertility patterns, and relating those features to the characteristics of the family in each region and subgroup, as well as to

[23] United Nations Secretariat, Population Division, "World and regional population prospects", *Population Debate*, vol. I, part two.

[24] United Nations publication, Sales No. 72.XIII.4.

[25] United Nations publication, Sales No. 69.XIII.3.

[26] Food and Agriculture Organization of the United Nations, *Monthly Bulletin of Agricultural Economics and Statistics*, vol. 21, No. 1 (January 1972), pp. 1-10.

[27] International Labour Organisation, parts I-V, 1971; and part VI, 1973.

[28] *The Determinants and Consequences of Population Trends: New Summary of Findings on Interaction of Demographic, Economic and Social Factors*, vol. I (United Nations publication, Sales No. 71.XIII.5).

variations in underlying economic and social conditions. Such studies are indispensable for the formulation of national population policies and are needed to ensure efficiency in the design, administration and evaluation of national family planning programmes The findings of such studies may aid Governments in identifying priority areas where communication programmes might be effective in motivating change in human reproduc-

and the way in which they are interrelated with the different socio-economic and cultural factors in various areas and regions of the world.

58. A number of important studies have been completed in recent years, including: *Conditions and Trends of Fertility in the World, 1960-1965;*[29] *Variables and Questionnaire for Comparative Fertility Studies;*[30] *Human Fertility and National Development: A Challenge to Science and Technology;*[31] *Measures, Policies and Programmes Affecting Fertility.*[32]

59. At the regional ...

and small towns in four of these countries. These

has undertaken a study of induced abortion to determine its incidence and its social correlates. Surveys in four capital cities were carried out and the results are being analysed.

60 At the Economic Commission for Europe, a project on fertility and family planning has been undertaken recently based on a comparative study of twelve European national surveys A relevant project of the Economic Commission for Africa is the conduct of pilot studies on fertility and infant mortality. ECA is also collaborating with the University of Ibadan to study the sub-fecundity and sterility which are prevalent in some population groups in Africa. The WHO may also be involved in this study. The ECLA is studying the sociological aspects of family size and structure in the context of Latin American conditions Also in Latin America, as in other regions, UNFPA is funding the processing of 1970 census data or demographic sample surveys with special emphasis on fertility patterns, as in the Dominican Republic and elsewhere. Analyses of fertility differentials in relation to levels of education, occupational skills and other characteristics are incorporated in the country demographic studies being done by ECAFE and by ECWA.

61. The WHO is, of course, the principal agency in the United Nations system involved in promoting, assisting and co-ordinating research on all aspects of human reproduction, including methods of fertility regulation. Further information on this topic is given

Mortality and morbidity

62. The concern of the ...

of disease to the purely statistical aspects of compiling and disseminating more complete and reliable data on

the United Nations system: the role of WHO in the health and biomedical fields; the concern of the ILO with labour productivity and job-absenteeism as affected by morbidity, length of working life, job safety and occupational hazards etc ; the concern of FAO with the state of nutrition and its role in morbidity and mortality, particularly among children and youth; the role of UNICEF with its programmes in collaboration with WHO in training and education for better maternal and child health care and the prevention of disease or premature mortality.

63. From a demographic point of view, studies of mortality levels and their future trends are essential inputs for preparing population estimates and projections. Such studies also throw light on the relative contributions of public health programmes and of economic and social development to the decline in mortality and the role of declining mortality in the acceleration of population growth rates. Very high priority is placed

64. Population policies in relation to development strategies and goals within the context of United Nations declarations and principles, presuppose the necessity of continuing progress in reducing mortality. Hence, for countries where population growth rates are deemed too rapid, the desirable solution is to balance lower mortality with lower fertility. Advancing civilization and progress have taken mankind much beyond the primitive conditions of slow rates of population growth automatically brought about by high fertility rates very nearly offset by high mortality rates.

65. Development of model life tables by the United Nations in the early 1950s was an important contribution to demographic research, particularly in the preparation of population projections for developing countries where census and vital statistics data are deficient. Recent methodological advances, as well as an increase in basic statistical information, suggest that a revision of the United Nations model life tables

[29] United Nations publication, Sales No E.72.XIII.3
[30] United Nations publication, Sales No 69.XIII.4
[31] United Nations publication, Sales No 71.IIA.12.
[32] United Nations publication, Sales No E.72.XIII.2

be timely. The report of an *Ad Hoc* Committee of Experts on Methods of Revising United Nations Model Life Tables has recommended such revision.[33]

66. The World Health Organization is participating actively with the United Nations in formulating the assumptions concerning future trends in mortality for purposes of the current revisions in the population projections by countries and regions. Furthermore, current and projected WHO studies (supported in part by UNFPA funds) on foetal, infant and early childhood mortality patterns in relation to social and economic factors, and on urban-rural differentials in mortality levels will have important applications in the population work of the United Nations system, as well as in broader areas of social policy.

Migration and urbanization

67. In many countries, developed as well as developing, a major population problem relates to the geographical maldistribution of the population and to *the excessive flow of rural migrants to urban centres*. It is recognized that urbanization is not, in itself, an undesirable phenomenon. It may be the reflection of vigorous development and modernization processes and may, in turn, contribute to them. Urbanization tends to *have undesirable consequences when it is unplanned* and when its momentum is out of balance with economic and social development, as is often the case in developing countries. In such circumstances, a large and rapid flow of rural migrants to central cities results in the creation of slums, high urban unemployment and a variety of other social problems as the absorption capacities of these cities become overstrained. Problems of unplanned and rapid urbanization also threaten the preservation of environmental quality and bring into sharp focus the need for regional development planning within national development plans.

68. Work at the United Nations includes studies of the levels, trends and structures of the urban and rural population, their changing redistribution and their accompanying economic and social correlates. Projections of urban and rural population for countries and regions of the world have also been made[34] and are currently being revised. Such projections provide an important demographic component for government planning in such areas as housing, education and health services. Work along similar lines is being done by the regional economic commissions for countries in their respective regions. Studies of internal migration with emphasis on rural to urban migration have also figured in the work programme of CELADE and the regional economic commissions, and additional studies are projected in the light of 1970 census of population results.

69. Problems of rural employment and underemployment engage the attention of both FAO and the ILO, as do various aspects of rural to urban migration. The impact of rapid urbanization on health and edu tional services are matters to which WHO and UNES are giving increased attention. In view of the fact large proportions of rural youth, particularly in veloping countries, leave the countryside for work life in the cities by the time they reach their late te their basic literacy, education and vocational prepa tion for urban life is a matter of urgent importan Governments need to give much more attention to general deficiency in their rural school systems. provision in the urban receiving areas of special vo tional training for rural migrants, both youths adults, is another approach. Greater international sistance to developing countries is badly needed in area of education and vocational training of rural yo through appropriate programmes of UNESCO, the I and FAO, if more resources can be made available.

33 E/CN.9/273, dated 10 August 1972.

34 *Growth of the World's Urban and Rural Population*, 1920-2000.

70. Additional national and international assista is also needed to help remedy the serious gaps information in developing countries concerning volume, characteristics, origins and destinations, a employment experience of migrants. This informati should relate to all patterns and streams of curr internal migration (rural to urban, urban to urb urban to rural and rural to rural) to provide poli guidance for directing, or redirecting, existing patte of population and labour force redistribution.

71. In contrast with the field of internal migrati where a considerable amount of work is being done, field of international migration appears to have be relatively neglected over a long period of time. Intern tional migratory movements have become of increasi importance as policies of major developed countr have undergone much change affecting the volum direction and duration of migratory moves as well the demographic, economic and social characteristics the migrants. In many developing countries, on the oth *hand, an important problem is the exodus of p* fessional and highly skilled workers who emigrate developed countries—the so-called "brain-drain". T whole matter of *international migration needs restu* and reappraisal to develop the facts essential to intern tional policy consideration. The Economic Commissi for Europe is, in fact, including a chapter on t European experience and prospects regarding inte country migration of labour in its current study demographic trends in Europe and outlook to the ye 2000. The ILO, which has in the past adopted seve international labour standards to safeguard terms employment and working conditions of migrant worke is now giving renewed impetus to research, debate a standard-setting in this field.

Interrelations between population and economic and social development

72. The objectives of the system's research a studies on demographic aspects of development are improve knowledge of the two-way relationshi between population growth, structure and distributio

on development and of the effects of development levels and patterns on population trends. Such studies are particularly relevant to the implementation of the International Development Strategy which, as already indicated, urges Governments to include demographic objectives in their national development plans. They are also essential to sectoral development strategies, such as the ILO World Employment Programme, the FAO Indicative World Plan for Agricultural Development, and especially to any World Population Plan of Action that may emerge from the World Population Conference in 1974.

73. The nature of the interrelations between population and development is, however, both complex and varying among regions, countries and cultures Contrary to the commonly held view, current knowledge makes it easier to understand the general nature of the impact of economic development on population growth than the significance of population trends on economic [illegible]

[illegible] issues. The report of the Symposium on Population and Development [35] pointed out that it is not possible to have a clear-cut line of causation between population growth at one end and consequences at the other end The reason for this is that the consequences must depend upon what else is occurring in the economy simultaneously. The Symposium examined some of the important interrelations between population and socio-economic development, as for example, population in relation to (*a*) natural resources; (*b*) food and agriculture; (*c*) health; (*d*) education and employment; and (*e*) social inequality.

74 The research and operational programmes of each of the specialized agencies, of UNFPA and of the other organs of the United Nations system directed towards socio-economic development, have been shaped in the light of the interactions with population factors and are being continually reoriented to take into account advancing knowledge and experience.

75. To the extent that it covers practically every aspect and facet of development, the United Nations and its system of organizations are well situated to develop the comprehensive knowledge on the interrelationships between population and development which is needed for both national and international decision-making. Although much work still remains to be done, a considerable amount of methodological research and of comparative and case studies has already been made available by them to States Members. Mention may be made, for example, of the ILO research programme (including the elaboration of economic-demographic simulation models and empirical studies) on the interaction between population and employment factors, within the framework of its World Employment Programme; the FAO methodological research and country studies on the effects of different rates of population growth on food and agricultural development; the stimulus given by WHO to research into the implications of population trends for health policy planning and investment needs, the UNESCO studies on the interrelations between population change and educational development (including the development of related simulation models) and on socio-cultural institutions, values and attitudes related to demographic change, especially at the family level, and the research being carried out on the dynamics of population/environment interrelations within the framework of the UNESCO programme on Man and the Biosphere

76 In historical perspective, few achievements in demographic and related socio-economic research rival in importance the pioneering contributions of the United Nations in developing in the early 1950s the first scientifically based projections of the growth of the world population, [36] and the landmark study, *Determinants and Consequences of Population Trends*, [37] a synthesis of the then existing world literature on the relationship between population changes and economic and social conditions. The massive work of revision and updating the text of the latter study was recently completed [38]

Population policies

77. The main objectives of the system's programme of work in this relatively new field are

(*a*) To analyse and systematize national experience in the development and implementation of population policies;

(*b*) To develop further the pertinent knowledge,

(*c*) To provide technically sound advice to the Economic and Social Council, the General Assembly and the governing organs of the agencies concerned,

(*d*) To provide guidance in all aspects of national population policies to Governments that desire it

78. While taking into consideration the economic, social, cultural and institutional aspects of policy-making, the programme concentrates on major demographic variables, their determinants and implications [illegible] largely relies upon the findings of the research and technical work being done by the Secretariat and upon studies and findings of the regional economic commis-

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[35] Report of the United Nations Symposium on Population and Development, Cairo, 4-14 June 1973, see *Population Debate*, vol II, annex I.

[36] [illegible] range [illegible] (Sales [illegible] popula [illegible] *ceedings of the World Population Conference, 1954*, vol. III (United Nations publication, Sales No. 55.XIII.8), pp. 283-328

[37] United Nations publication, Sales No 53.XIII.3.

[38] *The Determinants and Consequences of Population Trends. New Summary of Findings on Interaction of Demographic, Economic and Social Factors*, vol. 1 (United Nations publication, Sales No 71.XIII.5).

sions, regional demographic research and training centres, the specialized agencies and by the competent national research institutions organized under the Committee on International Co-ordination of National Research in Demography (CICRED). It will be developed with due regard to other developmental policies, such as educational, health, employment and rural and agricultural and industrial development policies that come within the purview of the respective specialized agencies and organizations of the United Nations system.

79. Major emphasis is placed on national policies and on the specific tasks required for successful implementation of the International Development Strategy. Within this framework, special attention is given to problems and techniques relating to the consideration of demographic factors in planning; the establishment of demographic objectives and the necessary technical background; adoption of appropriate measures and programmes relevant to population changes; and review and appraisal of the implementation of national policies in so far as demographic factors are concerned. Guidance on population policy matters will be provided to Governments that request it as knowledge and methodology develop.

80. In addition to the foregoing, an inventory of national population policies is maintained. Major studies now in progress include the following: comparative analysis of population policy development; guidelines for demographic considerations in planning; a technical background study for the World Population Plan of Action and a draft World Population Plan of Action. The analysis of the results of the Second Inquiry among Governments concerning Population Growth and Development recently carried out by the Secretariat with assistance from the regional commissions is also relevant here. A report on the findings of the Inquiry constitutes part of the background material for the World Population Conference.

Family planning [39]

81. The three main objectives of national family planning programmes launched by developing countries are to improve the health of mothers and children, to increase the welfare and over-all well-being of the population and to accelerate the pace of economic and social development. [40] In recognition of the fact that the rate of growth of population is related to the pace of economic and social progress of a given country, family planning programmes have, in many instances, been fostered as an element in national development plans. In such a context, family planning efforts are considered in relation to other national development policies and programmes, such as health, education, employment and social welfare. [40]

82. The activities of the United Nations in support of national family planning programmes, like other types of United Nations assistance, are carried out only at the request of Governments and in accordance with the provisions and guidelines of relevant resolutions of the General Assembly and of the Economic and Social Council, and in the case of the specialized agencies, in accordance with the enabling resolutions of their own governing organs. As has already been indicated, the system views and supports population programmes as integral and complementary efforts to, and not as substitutes for, the promotion of economic and social development.

83. The UNFPA has been devoting a substantial part of its allocations to family planning programmes through assistance to Governments and through funding related activities of the various United Nations organizations, such as WHO, UNICEF, the ILO, FAO and UNESCO. [41] These programmes mainly involve the provision of services, but also encompass a variety of activities concerned with planning, administration, training, research and evaluation. Large-scale country family planning projects assisted by UNFPA are under way in all developing regions. These activities are now being further strengthened by providing direct funding assistance to national organizations selected by the countries concerned.

84. Assistance to family planning is an integral part of the programme of WHO to develop and strengthen health services. An expanded programme of work in family planning as part of the national health services, and integrated particularly with maternal and child care, has been implemented in consultation with over 50 Governments by WHO or through joint planning missions with the United Nations and other specialized agencies. WHO multidisciplinary teams have been established in all regions and in the interregional programme to provide over-all guidance and direction for country projects or request an intercountry and interregional activities. Major national programmes for the development of integrated maternal and child health/family planning services are receiving joint WHO/UNICEF/UNFPA assistance in each of the regions. The WHO is also expanding its work in the collection, processing, evaluation and dissemination of family planning statistics.

85. A series of operational studies to test and evaluate a variety of approaches to family planning has been designed by WHO. Particular emphasis is given to studies on the acceptability and utilization of services as well as functions of health personnel in family planning. Collaborative epidemiological studies on the effects on family health of patterns of family formation are being undertaken in a number of countries. Special studies are being conducted to investigate statistical aspects of evaluation of family planning programmes.

[39] Including education and communication in the field of family planning.

[40] *Human Fertility and National Development: A Challenge to Science and Technology* (see foot-note 31), p. 62.

[41] "United Nations Fund for Population Activities, 1969-1972: progress report by the Executive Director" (DP/L.273/Add.2), para. 73.

86. The WHO has been active in promoting, assisting and co-ordinating research on all aspects of human reproduction, including methods of fertility regulation, the impact on health of family planning and the delivery of family planning care in health services. Other major components of the WHO programme in human reproduction include the building up of research facilities in the context of national family programmes and support to epidemiological and operations research in human reproduction and family planning. These projects have as their objective studying, or developing the resources required to study, factors affecting the provision and acceptance of family planning, including, in particular, the study of the side-effects of contraceptive agents in different populations.

87. The UNICEF sees its involvement in family as yet another means of carrying out a comprehensive approach to improve the health and welfare of children and their families in which family planning is a component in a broader scheme of policies, programmes and services affecting them. In this broad context, UNICEF supports the idea of planning for the family, which is a responsibility shared by the country, the community and the parents, covering positive social measures to improve the level of living of families, to educate and enlighten parents and to protect and prepare children and adolescents so that they in turn may contribute to the development and enrichment of their families, their communities and their countries.

88. The activities of UNICEF with regard to fertility regulations are concerned with measures undertaken at the request of Governments, through the strengthening of maternal and child health services in collaboration with WHO to assist family planning programmes. In some countries, urban and rural health centres are being strengthened with cash grants for training of personnel, equipment and transport to provide expanded maternal and child health services, including family planning. The Fund is also actively seeking ways to support educational and motivational activities designed to reach broader segments of the population, and especially women and girls, not ordinarily reached by health and social services. Some of the channels would be agricultural extension services, various forms of women's education, including literacy programmes, as effective means of raising the status of women and increasing their motivation towards responsible parenthood, community development programmes, social services and the mass media. Some beginnings have been made in exploring these new channels for reaching not only mothers, but other members of the family.

89. Production possibilities of contraceptives in developing countries are currently under active consideration in UNIDO. In response to increasing requests from States Members, the organization is now formulating a technical assistance programme for UNFPA financing, including feasibility studies for the setting-up of contraceptive production facilities, research of developed and local raw material for production of contraceptives and projects for the development and modernization of existing plants.

90. The ILO has as its objective the full involvement in family planning programmes of the social institutions and services within its purview—in particular, trade unions and labour education bodies, managements and occupational health and welfare services, labour administration, social security and co-operatives.

91. The ILO programme in this respect (with UNFPA funding) uses four main approaches:

(a) To stimulate and support trade unions and labour education bodies to enable them to participate in family planning programmes;

(b) To stimulate employers in view of the role occupational health and welfare services can play in bringing family planning information and facilities to the place of work;

(c) To encourage the extension of family planning promotional, educational and motivational activities to include co-operatives;

(d) To promote family planning service through medical care component in social security, especially in Latin America.

To ensure full co-ordination of efforts in the various fields of competence of the ILO concerning population and family planning, the ILO regional advisers in Asia and Africa have been grouped together to form labour and population teams In 1974, a similar programme is to be initiated in Latin America and in the Middle East.

92 A major problem in developing countries is to reach the families in the numerous and scattered villages in the rural areas where most people live and to motivate them, through educational measures, to make rational decisions on family size in the context of everyday living conditions. The existing agricultural programmes of FAO and its institutions and services provide excellent channels of communication with farmers and their families through measures for extension, home economics, agrarian reform, social security, agricultural credit, co-operatives, improved nutrition and general improvement in rural life. There is, therefore, considerable opportunity for including population education and motivation activities within the over-all scope of FAO activities for rural development. Work in this area was initiated under the FAO Planning for Better Family Living Programme (PBFL), approved by the FAO Conference in 1967. Field activities are now also being supported in an increasing number of countries.

93. In direct support of family planning programmes, UNESCO is promoting research, training, evaluation and materials development in family planning communications, and has begun work on the development of a systems approach for programme management. Regional communications advisers (family planning) have been appointed for tates

and the Africa, Asia and Latin America regions, to service and assist regional and national programmes, on request. Long-term assistance is being given with UNFPA financing, to the communication components of a number of large-scale national programmes, and training programmes have been established for national personnel. The UNESCO expects to assist some 25 national programmes and train approximately 400 family planning communications personnel during the period 1973-1978.

94. The World Bank assists national population programmes through the strengthening and extension of institutions, facilities and activities involved in carrying out such programmes. A substantial portion of the Bank's funds are devoted to extending the network of health facilities used in delivering family planning services and in training programme personnel. Such facilities include training schools, family planning clinics, rural health centres, maternity hospitals and smaller maternity centres, and necessary equipment and vehicles. In addition, the Bank's projects often provide financial and technical assistance support for the provision of family planning services; the training of social workers, demographers and medical and paramedical personnel; public information campaigns and face-to-face motivation activities; population education in schools; and evaluation and research activities. Throughout project development and execution, the Bank pays particular attention to activities designed to support the development of institutions and personnel, to develop information needed by management to measure and analyse the progress of programmes, and to broaden the content of programmes by including innovative and experimental components that may add to programme effectiveness. Bank projects have also supported research on the socio-economic determinants of fertility behaviour.

95. Evaluation, now generally recognized as a fundamental component of any family planning scheme, is receiving increasing attention from all organizations. Several interagency missions have recently been organized by the United Nations to evaluate family planning programmes in individual countries. Countries with such programmes are being assisted and encouraged to gain the necessary expertise and develop the basic evaluation machinery needed to carry out evaluation of their programmes on a continuous basis. These activities are accompanied and supported by research to develop practical evaluation techniques and to test a variety of approaches to family planning and population dynamics. Particular emphasis is placed on the communications and educational aspects of these programmes (UNESCO) and on the acceptability and utilization of services and the functions of health and other specialized personnel (WHO).

Training and other educational activities supporting population work

96. One of the most effective means for the United Nations system to assist Governments in developing their capacities to deal with population matters is through technical training of countries in demography, statistics and related disciplines covering substantive and methodological fields. This has led to the establishment over a period of years of a number of regional demographic training and research centres as co-operative undertakings of the United Nations.

97. There are now five of these centres for regional demographic training and research: in Asia and the Far East, at Chembur, India; in Latin America, CELADE at Santiago, Chile, with a regional centre at San José, Costa Rica; and in Africa, at Cairo, Accra and Yaounde. These centres receive financial support from UNFPA. The centres at Chembur and Santiago are the oldest, having been established in 1956 and 1957, respectively; the centre at Cairo began operations in 1963 and the number of countries served by it has increased from eight to 25. The centres at Accra and Yaounde are the newest ones, having been established only at the end of 1971. While it would be tedious to detail extensive training programmes of the centres, their important contributions to research and operations have been suggested in the preceding paragraphs.

98. Fellowships for training abroad or at the United Nations-sponsored regional training centres for study and training in population are awarded to persons from developing countries nominated by their Governments. These fellowships are normally awarded for periods of up to one year, but may be extended. During the two-year period ending 30 June 1973, fellowships were awarded by the United Nations alone to 1,045 nationals from 94 developing countries.

99. Requests for United Nations support for the establishment of additional demographic training and research centres have been received from the Governments of Egypt, Romania and the Union of Soviet Socialist Republics. The Romanian request has now been approved, and the other proposals are now under study and in various stages of negotiation between the United Nations and the Governments concerned.

100. A plan for a co-operative project of the United Nations and several of the specialized agencies to provide interdisciplinary training on population matters on both a short-term and a long-term basis was recommended by the Population Commission. A committee has been established to develop this programme, including the expansion of the current training programmes at existing national and regional institutions. This committee has thus far discussed the possibilities of setting up centres for training in population policy and for family planning.

101. Another important set of education and training activities are those designed to include population topics in broader training programmes (such as those for development planners in education, agriculture and other fields) and basic courses for various categories of professionals, particularly health personnel. In the same context, mention may be made of the assistance being provided by UNESCO in the introduction of

population and family life subjects in school curricula and out-of-school programmes.

102. Another important contribution to, and instrument of, education and training in population fields is represented by the series of methodological manuals and reports prepared and published by the United Nations in several languages. Many of these manuals have been prepared by the Population Division, others by the Division in collaboration with some of the specialized agencies, and still others by outside experts. These manuals are being used throughout the world at universities, research and training centres, and by countless individual investigators and analysts working in various Government or private agencies The scope and variety of these manuals is suggested by the titles of the following more recent publications. *Estimating Future School Enrolment in Developing Countries*,[42] which was a joint project with UNESCO, *Methods of Estimating Basic Demographic Measures from Incomplete Data*,[43] prepared for the United Nations by the Office of Population Research, Princeton University, *Methods of Analysing Census Data on Economic Activities of the Population*,[44] prepared for the United Nations by the Population Studies Centre of the [illegible] *of Measuring In-* [illegible] *ojecting the Eco-* [illegible] ared in collaboration with the ILO, and *Methods of Projecting Households and Families*.[47]

103. In addition to formal training programmes, the United Nations system has sponsored (or co-sponsored) many other forums for discussion or technical examination of various facets of population problems and issues These forums have included workshops, seminars, symposia, regional and world population conferences. The seminars and workshops of a regional or interregional character have served to stimulate and orient demographic research and to reveal gaps in knowledge, while the regional and world population conferences have provided broad international forums for the interchange of information on population problems and to call attention to their interaction with economic and social development issues and policies.

104. The two Asian Population Conferences (New Delhi, 1963, and Tokyo, 1972) organized by ECAFE were the first intergovernmental conferences sponsored by the United Nations. Twenty-three countries were represented at the Second Asian Population Conference which resulted in the adoption by the Conference of a Declaration of Population Strategy for Development. It is considered as one of the most far-reaching policy statements thus far endorsed by an international conference of Governments.

[42] United Nations publication, Sales No. 66 XIII 3.
[43] United Nations publication, Sales No 67.XIII 2.
[44] [illegible]
[45] [illegible]
[46] [illegible]
[47] [illegible]

105. The first Latin American Regional Population Conference was held at Mexico City in August 1970, under the joint auspices of the International Union for the Scientific Study of Population, CELADE, ECLA and El Colegio de Mexico. An African regional population conference was held at Accra, Ghana, in 1971. A population conference for the region of Western Asia was held at Beirut in February 1974.

106 Reference has already been made to the intergovernmental character of the present World Population Conference, in contrast to the previous two World Population Conferences (Rome, 1954, and Belgrade, 1965) under United Nations auspices. The present Conference has been preceded by four international symposia attended by technicians and experts. Regional consultations preparatory to the Conference also have been held at meetings of an intergovernmental nature organized by the regional economic commissions. The Conference itself is the largest of its kind ever held and marks the high point of the extensive world-wide activities organized for the observance of World Population Year by UNFPA.

Concluding observations

107. Any over-all assessment of the population activities of the system must recognize that "population" is a relatively new field of international endeavour In most of the agencies, the development of significant activities in population has only taken place during the past two or three years, even in the two organizations with a long-standing interest in population matters—the United Nations and WHO—the development of a comprehensive operational programme in population may be said to have begun only in the latter part of the 1960s.

108. The formulation and implementation of an effective programme of international assistance entail institutional promotional problems, and often raise difficult programming and technical issues. Various factors, however, peculiar to the population field have permitted the United Nations system to make gratifying progress in this programme sector in a relatively short period of time.

109. When, in the second half of the 1960s, the agencies were directed to embark upon the execution of expanded programmes of assistance in population, few of them were adequately equipped with the infrastructure with which to develop these programmes. The support forthcoming from UNFPA—received, first, at the end of the 1960s, and in increasing amounts since 1970—has, however, greatly helped them in overcoming this difficulty. The early phase of the existence of UNFPA was characterized by a procedural flexibility which permitted it to provide assistance to organizations where it was most needed, be it for programmes or infrastructure, thus enabling them to begin carrying out their expanded mandates while at the same time strengthening their capacity for further expansion.

110. Much, of course, remains to be done, both to strengthen the capacity of the system to deliver assistance and to heighten awareness of population problems among agency "constituencies". In a number of organizations, for example, population programmes are still too headquarters-based, and a considerable amount of promotional work will continue to be required in the years to come to expand field activities still further. Moreover, internal efforts are still required to make all officials in the various technical units and in the field aware of the population "dimension" of their work, and to convince them to give the time and attention to population concerns that they deserve.

111. The clarification of population mandates has naturally been followed in most organizations by the formulation and approval of specific programmes, and activities in the field of population have now gained their rightful place in the programme budgets of practically all organizations concerned.

112. Perhaps the single most important constraint encountered, so far, by all organizations has been a general shortage of trained personnel and, more particularly, the difficulty of finding experts for field assignments in the various technical areas of competence of United Nations organizations who are also sufficiently knowledgeable in population matters. This problem is being attacked, as greater experience is gained, through such measures as learning-on-the-job, the provision of in-service training courses for experts, and the systematic dissemination of literature and other information on population. However, the organizations are agreed that it will continue to require priority attention by all concerned in the years to come.

113. Co-operation among the organizations in carrying out these activities is also entering a new stage. During the second half of the 1960s, the main emphasis was on the harmonization of mandates and on division of responsibilities. This emphasis on the "formal" aspects of co-ordination is now being progressively replaced by a new and more creative approach, stressing collaboration at the technical level and co-operation in the formulation and execution of programmes, rather than the mere allocation of responsibilities. The Population Commission at the intergovernmental level, and the Sub-Committee on Population of the Administrative Committee on Co-ordination and the Inter-Agency Consultative Committee of UNFPA at the intersecretariat level, have played a key role in promoting this trend.

114. It must be acknowledged that in these efforts to ensure effective programme control and a high level of interorganizational co-operation, an elaborate network of committees and working groups has been established, both at the intergovernmental and secretariat levels. As those concerned become more accustomed to working together and population activities become a more familiar part of organizations' programmes, it is expected that this machinery will be much streamlined and simplified.

115. It is increasingly realized that co-ordination of programme policies and objectives, at both the country and the global levels, must precede co-ordination of short-term programmes, if fragmentation of activities is to be avoided and efforts concentrated on priority needs. The new programming and budgetary techniques recently introduced in most United Nations organizations, particularly programme-budgeting and medium-term planning, are providing valuable opportunities for working towards concepts of joint planning in programme areas of major interagency concern, such as population. In helping define the tasks and objectives of the system, the results of the Conference will not only guide the future programmes of organizations, but will greatly facilitate progress towards more integrated planning of population activities.

THE ROLE OF INTERNATIONAL ASSISTANCE IN THE POPULATION FIELDS

United Nations Fund for Population Activities

1. The focus of this paper is on the transfer of funds, materials and technical expertise for population activities from international, governmental and non-governmental sources to developing countries. The discussion touches on the growth and current and future volume of such assistance, its adequacy in terms of current and future needs, the terms on which it is given, the problems of making it effective and the difficulties of co-ordinating multiple sources of assistance.

2. In the past several years, such assistance has been expanding rapidly both in concept and in practice, as appreciation of its fundamental importance for the achievement of significant and lasting improvements in the quality of life and particularly of the complex interrelationships between population and the development process has also grown.

3. There is, unfortunately, no consensus as to just exactly what "population activities" are, although it is clear that they cover much more than pure demography or the delivery of family planning services and that they include a broad spectrum of training, research, information and operational activities on population matters. Population activities so far covered by international assistance have been broadly classified into the following major subject areas: (*a*) basic population data; (*b*) population dynamics; (*c*) population policy; (*d*) family planning; and (*e*) communication and education.[1]

DEVELOPMENT OF INTERNATIONAL ASSISTANCE FOR POPULATION

4. The history of international population assistance is brief but spectacular. As recently as from 15 to 20 years ago, there was little open discussion among Governments of the need for assistance to the third world except in demography and statistics. On the contrary, the forces opposing assistance to such activities as family planning and population policy on religious, cultural, nationalistic or political grounds were still generally dominant. Within developed countries themselves, the promotion of family planning was still to a large extent seen as the exclusive concern of voluntary endeavour, supported by private philanthropy. Today, population activities are fully recognized as the legitimate concern of Governments and of the international community.

5. In the early 1950s, the United Nations began to assist developing countries with census-taking, demographic training and the preparation of studies of the relationships between population trends and social and economic factors, as well as with some action-oriented activities. In 1952, two non-governmental agencies concerned with assistance on population were established—the International Planned Parenthood Federation (IPPF) and The Population Council. The Ford Foundation and the Rockefeller Foundation also began to assist population-related activities. Together, these four non-governmental agencies were the main sources of assistance for population and related activities until the late 1960s when governmental resources became available on a large scale.

6. The first Government to give assistance for family planning to a developing country was that of Sweden in 1958. That assistance was for support of an experimental programme in Sri Lanka (Ceylon), and was followed by similar assistance to the Government of Pakistan in 1961. The United Kingdom of Great Britain and Northern Ireland initiated its bilateral population assistance programme on a modest scale in 1964. The Government of the United States of America began to include population activities in its development assistance in 1965 and since 1968 has earmarked an ever-increasing amount of funds within its foreign assistance programme for population activities.

7. In the early 1970s a number of Governments followed the lead provided by Sweden, the United Kingdom and the United States, most notably Canada, Denmark, the Federal Republic of Germany, Japan, the Netherlands and Norway, all of which increased their support of bilateral as well as multilateral programmes.

8. The barriers which to a large extent had prevented the United Nations system from responding directly to the needs of developing countries for assistance in family planning and many other population activities began to lift around the mid-1960s. [illegible] a major factor was the Asian Population Conference held in 1963 and organized by the United Nations Economic Commission for Asia and the Far East (ECAFE). It set the tone for the development and expansion of population programmes in that region and [illegible] other policy-making bodies within the United Nations system to [illegible]. The first direct support to family planning programmes by the [illegible]

[1] United Nations Fund for Population Activities, Report 1969-1972 (New York, 1973), p. [illegible]

at the request of the Government of India in early 1965.

9. Beginning in 1965, the World Health Organization (WHO) initiated its assistance to the health aspects of human reproduction, family planning and population dynamics. The Organization's mandate was gradually broadened to provide advisory services to Governments and other supporting activities on health aspects of fertility, sterility and fertility regulation methods, including the organization of family planning services as part of organized health services, particularly maternal and child health.

10. Late in 1966, a consensus was reached in the United Nations General Assembly (resolution 2211 (XXI)) concerning the provision of population assistance, upon request, in the areas of training, research, information and advisory services.[2] In response, the following year, the Secretary-General established a Trust Fund for Population Activities which, in its early stages, served mainly to strengthen the capacity of the United Nations proper to support demographic activities in the population fields. As demands upon the Fund increased, the General Assembly decided in 1969 to transfer its management to the United Nations Development Programme (UNDP) in order to associate its operations more directly with general funding for development as well as cover all responsibilities in the population field of the entire United Nations system. Following this, the Fund—renamed the "United Nations Fund for Population Activities" (UNFPA)—began to grow rapidly into a major source of international population assistance, in terms of both financial resources and programme funding.

11. In the meantime, the governing bodies of the United Nations Children's Fund (UNICEF), the International Labour Organisation (ILO), and the Food and Agriculture Organization of the United Nations (FAO), closely followed by the United Nations Educational, Scientific and Cultural Organization (UNESCO), also broadened their own mandates to include those aspects of population and family planning falling within their areas of competence.[3] In 1968, the International Bank for Reconstruction and Development (IBRD) began to consider the need for assistance to family planning programmes and related activities in developing countries and made its first loan—to Jamaica—in 1970.

12. While in 1960 total international assistance for population activities was only about $2 million, by 1965 this figure had grown to $18 million and by 1973 it exceeded the $200 million mark (see tables 1 and 2). Thus, within a span of 13 years, such assistance had increased a hundredfold. Undoubtedly, much of the rise in assistance can be attributed to the growing awareness during this period in both developed and developing countries[4] of the importance of the population variable as a major factor in development. Recognition of the impact of population factors on the development process was acknowledged in the general strategy adopted by the United Nations for the Second Development Decade.[5]

13. In 1973, a new stage of development in the short history of international assistance for population activities was reached—demands for assistance from UNFPA and several other donors began to exceed substantially the supply of funds available. It has been noticed that as countries adopt population programmes or policies in the context of their development plans, their absorptive capacities for population projects tend to expand, thus making it possible to increase international co-operation and support. It is important that the momentum of growth in population assistance be maintained, as continued increases can be expected both in the needs for aid by the developing countries and in their capacities to use such aid effectively.

TABLE 1. TRENDS IN DEVELOPMENT AND POPULATION ASSISTANCE, 1961-1973[a]

	Total official development assistance[b] *(Millions of dollars)*	*Population assistance*[c] *(Millions of dollars)*	*Population assistance as percentage of total assistance*
1973[d]	n.a.	220	—
1972	8,600	198	2.3
1971	7,700	154	2.0
1970	6,800	125	1.8
1969	6,600	86	1.3
1968	6,300	58	0.9
1967	6,600	30	0.5
1966	6,000	34	0.6
1965	5,900	18	0.3
1964	6,000	16	0.3
1963	5,800	11	0.2
1962	5,400	5	0.1
1961	5,200	6	0.1

SOURCES: Organisation for Economic Co-operation and Development, *Development Co-operation, 1972 Review* (Paris, December 1972); *idem*, *Development Assistance for Population Activities, 1971* (Paris, 1973); *idem*, "Aide aux programmes démographiques, 1972", Paris, January 1974 (mimeographed).

[a] Figures are net totals making allowance for double-counting due to transfers between donors.

[b] Excluding export credits, private investment and other commercial transfers.

[c] Not including grants by voluntary agencies for the years 1961-1969. In 1970, these grants amounted to $900,000.

[d] Provisional.

[2] *Official Records of the General Assembly, Twenty-first Session, Supplement No. 16.*

[3] For mandates and responsibilities of the organizations in the United Nations system, see *Human Fertility and National Development: A Challenge to Science and Technology* (United Nations publication, Sales No. E.71.II.A.12), chap. IX.

[4] Organisation for Economic Co-operation and Development, *Population Assistance to Asia 1960-1970* (Paris, 1972); *idem.*, *Population Assistance to Africa 1969-1970* (Paris, n.d.); *idem*, *Development Assistance for Population Activities in 1971* (Paris, 1973).

[5] General Assembly resolution 2626 (XXV), paras. 14, 15 and 65.

TABLE 2. ASSISTANCE FOR POPULATION ACTIVITIES BY MAJOR DONORS, 1960-1973

(Thousands of dollars)

Year	Governments													
	Australia	*Belgium*	*Canada*	*Denmark*	*Finland*	*Federal Republic of Germany*	*Japan*	*Netherlands*	*New Zealand*	*Norway*	*Sweden*	*Switzerland*	*United Kingdom*	*United States of America*
1973[a]	424	27	6,000	2,900	336	4,307	3,039	4,247	137	6,003	24,739	b	b	125,600
1972	357	18	4,681	1,953	293	2,435	2,196	3,041	77	5,539	12,668	191	6,706	123,265
1971		147	3,911	1,917	263	1,657	2,090	1,539		3,870	9,194	168	2,520	95,868
1970		10		1,349	75	1,525	378	1,408		990	6,522		434	74,506
1969				296	50	250	199	338		225	5,474		261	45,440
1968											3,056			34,750
1967											2,322			4,445
1966											1,364			3,892
1965											571			2,134
1964											532			
1963											241			
1962											91			
1961											91			
1960											91			

TABLE 2 (*continued*)

Year	Multilateral organizations [c]									Non-governmental organizations						
	United Nations	*ILO*	*FAO*	*UNESCO*	*WHO*	*UNICEF*	*UNFPA*	*IBRD*	*Others*	*IPPF*	*Population Council*	*Ford Foundation*	*Rockefeller Foundation*	*Others*	*Total Including Double Count*	*Net total Excluding Double Count*
1973 [a]	9,828	2,259	1,370	2,554	15,991	3,711	34,684	27,000	1,789	32,000	16,620	12,814	6,500	5,700	325,634	220,000
1972	5,952	989	574	28	6,374	2,371	19,840	34,400	6,577	24,935	17,360	14,647	6,608	4,400	292,325	198,585
1971	6,995	165	607	38	2,823	2,382	8,937	7,800	5,200	19,294	14,084	15,221	2,864	3,877	205,094	150,637
1970	1,942			16	1,669	6,407	3,218			9,077	16,717	15,094	15,124		153,243	124,673
1969	2,060			49	1,048	5,492				5,406	17,778	17,519	8,814		110,699	85,855
1968	3,773									820	11,323	12,513	1,867		68,102	58,038
1967										807	8,412	19,478	5,284		40,748	29,489
1966										211	7,383	27,243	4,206		44,299	34,311
1965										271	5,437	9,843	1,077		19,333	17,515
1964										108	2,832	13,340	2,803		19,615	15,853
1963										84	2,412	9,192			11,929	10,722
1962										72	2,412	2,948			5,523	4,684
1961										69	1,655	4,637			6,452	6,445
1960											1,500	1,607			3,198	2,148

SOURCES: G. Calogeropoulos, "Family planning and social and economic development", doctoral thesis, University of Paris, 1973, in Organisation for Economic Co-operation and Development, *Development Assistance for Population Activities in 1971* (Paris, 1973); *idem*, "Aide aux programmes démographiques, 1972", Paris, 1974 (mimeographed).

[a] Provisional.
[b] Not available.
[c] Some adjustments to the data for multilateral organizations (and to the totals) have been made by UNFPA to include more recent data.

Sources of population assistance[6]

14. Today, a large number of donors provide assistance for population programmes (see table 1). Assistance flows through three channels: multilateral, bilateral governmental; and non-governmental Although the private sector is an important source of funds, by far the greater part of resources now comes from Governments Major donors channel funds for assistance through international or national bodies (governmental or non-governmental) or provide such assistance directly to developing countries.

15. Although over 60 Governments have at one time or another contributed to international population assistance,[7] the major share comes from less than a dozen countries By far the greatest contribution is that provided by the United States of America—from a modest beginning in 1965 of $2.1 million, its assistance reached $126 million in 1973. Over the period 1965-1973, 46 per cent of the assistance was used in direct support of population and family planning projects in the third world; 30 per cent was channelled through international organizations for regional and country activities; and the remainder went to universities and other institutions in the United States for research, training and advisory services mainly directed towards supporting activities in the developing countries.

16 The Scandinavian countries have also also led in increased international involvement in population matters. In 1973, total Swedish financial contributions reached approximately $25 million In the same year, Norway contributed a total of about $6 million for population assistance, representing about 9 per cent of its total official development assistance programme—the highest proportions of any donor country. Denmark has also given high priority to foreign population assistance, with a contribution in 1973 of nearly $3 million.

17. The United Kingdom is another major contributor, with a multilateral contribution of about $6.7 million in the year 1972/73. The Netherlands, the Federal Republic of Germany and Japan began their contributions in 1969 with the amounts of $340,000, $250,000 and $200,000, respectively In 1973, their support had grown to $4.2 million, $4.3 million and $3 million, respectively. Canada joined in 1971 with an amount of $4 million, which was increased to $5 million in 1973.

Multilateral assistance[8]

18 Multilateral population activities have grown remarkably in recent years. Until the mid-1960s, the role of the organizations within the United Nations system was restricted not merely by limited mandates in the population fields and lack of funds, but by the fact that few Governments had yet formulated national population policies or foreign aid policies on population In 1972, approximately 5 per cent of total Government development assistance provided to multilateral programmes was for population activities. Some countries, however, devote a high percentage of their multilateral funding to population work—for example, Norway, 13 per cent; Sweden, 10 per cent; and the United States, 7 per cent—but the majority of donor Governments limit population components to 2-3 per cent (see table 3).

Table 3 Government assistance for population activities as percentage of total official development assistance, 1972

Country	*Multilateral*	*Bilateral*	*Total*
Australia	3 0	—	0.1
Canada	2 0	0.5	1 0
Denmark	2.6	1.5	2.1
Finland	2 3	—	1.5
Germany, Federal Republic of	1 1	—	0.3
Japan	1.5	—	0 4
Netherlands	2 4	0.2	1.0
Norway	13 1	4 0	8 7
Sweden	10.1	3 4	6 4
Switzerland	0 6	—	0 3
United Kingdom	3 0	0 6	1.1
United States of America	7.3	2.7	3.6
Total	4.5	1.6	2.3

Source Organisation for Economic Co-operation and Development, "Aide aux programmes démographiques, 1972", Paris, January 1974 (mimeographed).
Note Excluding administrative costs.

United Nations

19. In the United Nations Secretariat, an indispensable technical basis had been laid for the [illegible] ment of population assistance by the work [illegible] since 1946 by the Population Division of the [illegible] ment of Economic and Social Affairs, [illegible] its demographic studies, including [illegible] economic factors related to demogra[illegible] through its promotion of training [illegible] graphic techniques. The Statistica[illegible] 1946, made an indispensable [illegible] promotion of the improvemen[illegible] and through disseminatio[illegible] the activities of the Unite[illegible] population have expanded [illegible] lation planning and the formul[illegible] of population policies [illegible]

[6] *Human Fertility and National Development: A Challenge to Science and Technology;* Organisation for Economic Co-operation and Development, *Agencies and Organisations Working in the International Population Assistance Field* [illegible]

[7] United Nations Fund for Population Activities, "Annual Report, 1973", document DP/44, para 13.

[8] A more comprehensive statement of the role of various organizations [illegible] "Activities of the [illegible] field", Population [illegible]

important areas of activity. Moreover, the activities of various offices of the United Nations in the field of population now encompass research and operational activities in fields relating to social development, human rights, status of women, public administration and rural and community development. The work of the United Nations includes important regional programmes in Africa, Asia and the Far East, Western Asia and Latin America, including regional demographic training and research centres. Assistance by the United Nations is provided mainly through development of international recommendations, preparation of technical manuals and handbooks, convening of conferences, seminars and training courses, provision of advisory services, development of regional training and research centres, provision of fellowships and preparation of studies and technical reports.

United Nations Children's Fund

20. The population activities of UNICEF arise from its concern for the health, welfare and development of children. In 1967, the mandate of UNICEF was broadened to include assistance in family planning as part of its maternal and child health services, upon the request of Governments. Realizing that those services could not carry the whole burden, UNICEF extended its assistance in 1970 to include schools, agricultural extension services and community development programmes. UNICEF aid is given mainly in the form of supplies, equipment, vehicles, training and educational materials.

World Health Organization

21. Of the specialized agencies of the United Nations, WHO has so far been the most involved in population activities. The mandate of WHO emphasizes the importance of the problems of population dynamics, human reproduction and family planning for the health and well-being of the family as well as the community. It recognizes the rationale of providing family planning as an integral part of health services, and the benefits resulting from it. The heavy involvement of WHO in population activities is reflected in the number of requests to WHO and UNFPA originating from national health authorities in some 60 developing countries. Assistance is provided mainly in the following areas:

(*a*) Promotion of the health aspects of family planning as a component part of a country's health services through project planning, administration and evaluation;

(*b*) Training of health personnel, including revision of curricula for the orientation of health workers in family health care and population dynamics;

(*c*) Biomedical and operational research, with emphasis on epidemiology, health behaviour, the delivery of services, and biomedical aspects of reproduction including contraceptive technological development, infertility, sub-fertility and abortion care.[9]

Food and Agriculture Organization of the United Nations

22. The FAO was the first specialized agency seriously concerned with world population growth, because of its effect on the balance between food and people. In 1967, the FAO Conference recommended that the Organization should be increasingly involved in the study of the relationship between food supplies and population growth and the interaction between demographic and agricultural changes. The Conference also approved an integrated approach to reaching families with information about the relationships among family resources, needs, goals, and size through existing national programmes. In 1973, the FAO Conference approved an expanded programme for population activities with the objective of strengthening national development policies and programmes by integrating population aspects into existing food and agricultural policies and programmes. It authorized the examination of all FAO programmes with a view towards broadening national development strategies to include population policies and programmes as an integral part of education, training, extension and other programmes reaching rural communities.

The International Labour Organisation

23. The involvement of the ILO derives from the impact of rapid population growth in developing countries on employment, training and the welfare of workers. A major programme of research and action on population and employment is being carried out under its World Employment Programme. The main objective is to expand the knowledge base for policy-making so that adequate account may be taken of the effect of population factors on employment and income distribution policies and of the effect of both of these on population policies. Furthermore, the ILO seeks to foster and support the involvement in population and family planning activities of its constituents—workers' and employers' organizations and public authorities responsible for employment and labour policies—within its fields of competence—labour education policies, occupational health and welfare services, social security institutions, co-operatives and management institutions.

United Nations Educational, Scientific and Cultural Organization

24. The work of UNESCO in population mainly concerns social science research, education and communication. Studies are conducted on the socio-cultural context for population and family planning activities, on behavioural change aspects, on methodological issues

[9] See World Health Organization, "Health trends and prospects in relation to population and development", *Population Debate*, vol. I, part four; *idem*, "Health and family planning" and "Research on the biomedical aspects of family planning programmes", *Population Debate*, vol. II, part eight.

relating to evaluation and on questions concerning the interaction between population dynamics and education. A sizable programme of research, training, evaluation and materials development in communications is being undertaken to find the best ways of utilizing the communications media in population programmes, including family planning. Assistance is also provided by UNESCO in the introduction of population and family life subjects into school curricula and out-of-school programmes, including the development of teaching materials and teacher training.

United Nations Fund for Population Activities

25. The primary purpose of UNFPA is to provide assistance to developing countries' population programmes Projects supported are normally executed through organizations in the United Nations system within their respective fields of competence The Fund has not only been instrumental in stimulating and expanding the over-all capability of the United Nations system in population to respond to the needs of these countries, but has, to some extent, assisted organizations playing a similar role outside that system. Ultimately, responsibility for execution of projects will be with recipient Governments, and the Fund is increasingly giving assistance directly to countries. It operates in close relationship with UNDP, using the UNDP field structure of resident representatives as the Fund's main mechanism in carrying out its work in various countries The UNFPA is primarily a grant-providing agency; responsibility for the implementation of programmes rests primarily with recipient countries, or in the case of global, interregional and regional programmes, with international organizations. The Fund's activities include the initiation, formulation, co-ordination, monitoring and evaluation of programmes and projects supported by it. The Fund is neutral as regards national population policies and approaches to deal with population problems It responds to requests and may support not only programmes designed to achieve a reduction of population growth, but activities to limit sterility and stimulate population increase.

26 By early 1974, the cumulative total resources pledged to the Fund exceeded $120 million. It was [illegible]

to provide comprehensive assistance to national family planning programmes and related activities have been signed so far with 11 Governments.[10] The largest amount yet committed by UNFPA under a country agreement is $13 million over a five-year period to Indonesia, in a joint funding operation with the Indonesian Government and IBRD (World Bank).

[10] The Governments of Chile, Egypt, Indonesia, Iran, Malaysia, Mauritius, Pakistan, the Philippines, Republic of Korea, Sri Lanka and Thailand Similar agreements are in preparation with a number of other countries, including Bangladesh and Turkey

International Bank for Reconstruction and Development

27. The decision in 1968 for the World Bank and its soft-loan affiliate, the International Development Association (IDA), to enter the field of population assistance was based on the conviction that rapid population growth is a major barrier to the economic and social progress of many developing countries. The Bank uses a three-step programme which begins with an assessment of the implications of population growth on development as part of the Bank's periodic economic reviews; it then undertakes, on request, sectoral analyses, lastly, it provides financial assistance to specific projects on conventional Bank terms or, to especially weak economies, on highly subsidized soft-loan terms (no interest, 50-year repayment period) To date, World Bank or IDA loans have been extended to eight developing countries,[11] in some instances in co-operation with other donors, providing for "hardware" items, such as buildings, vehicles, furniture and equipment, as well as "software" items, including training, demographic research and technical assistance By the end of 1973, the Bank had committed a total of $71 million

Organisation for Economic Co-operation and Development

28 Another multilateral organization active in population assistance is the Development Centre of the Organisation for Economic Co-operation and Development (OECD) The Centre studies the factors that influence Governments to adopt population policies and examines the effectiveness of population assistance. Direct assistance is mainly of an informational nature and includes the dissemination of population aid statistics and exchange of experience

Bilateral governmental assistance

29 To date, over 90 per cent of all bilateral aid on population has been supplied by two Governments, those of the United States of America and Sweden—the former being the larger source of funding. While most bilateral aid has been for family planning, a significant amount has also supported demographic and biomedical research.

30 The United States Agency for International Development (USAID) assists national family planning programmes in 35 countries. In 1972, country projects totalled nearly $28 million, with the largest sum going to the Philippines, followed by Indonesia and Thailand. A further $12 million was supplied for regional projects, including support for census and demographic studies, and for training and research in maternal and child health and family planning. The USAID is also a principal supplier of contraceptives and other supplies to some 70 countries.

[11] Egypt, India, Indonesia, Iran, Jamaica, Malaysia, Trinidad and Tobago, and Tunisia.

31. Sweden has given bilateral assistance for family planning to 25 countries, but is currently concentrating in fewer countries now that both multilateral and other bilateral aid are more readily available. At first, Swedish aid was provided mainly in the form of personnel, but increasing emphasis is being given to providing equipment and supplies, *inter alia*, through a bulk purchase scheme for contraceptives, mainly condoms. Other supported activities include sex education and communication.

32. The United Kingdom has given assistance for family planning, demography and population research to about 24 countries. In 1970, an interest-free loan of $2.5 million was offered to the Government of India in support of its family planning programme.

33. Several other countries have more recently, and on a smaller scale, begun to give bilateral population assistance. In general, such aid is given to countries in which the donor already operates a development assistance programme.

34. Thus, the Netherlands has provided $1.7 million over a four-year period, mainly for training, experts and studies to assist family planning activities in Indonesia, Kenya, Pakistan and Tunisia. Its bilateral programme is, however, being phased out and replaced by increasingly larger grants each year to multilateral organizations such as UNFPA. The bilateral programme of Denmark includes support for building costs, training programmes and contraceptives, with $500,000 going to the family planning programme in Thailand, and other grants to Bangladesh, Egypt, India and Uganda. The bilateral programme of Norway is especially concerned with maternal and child health, and supplies financial aid, including $1.1 million towards a post-partum family planning programme in India. The International Development Research Centre (IDRC) in Canada awards grants for population research, primarily to institutions in developing countries. The Federal Republic of Germany is supporting a training and research centre in Tunisia in co-operation with WHO and IPPF. Japan has given bilateral aid to Indonesia and the Philippines, with emphasis on supplying contraceptives and training in Japan of personnel from Asian countries.

Non-governmental organizations[12]

35. A number of non-governmental organizations have played an important pioneering role in the support of population activities. The four largest are IPPF, the Population Council, and the Ford and Rockefeller Foundations. A number of other smaller private organizations also contribute. Some of them function exclusively in the population field; others support population activities within a broad range of purposes and programmes. All the organizations provide a channel for private financial contributions, though many draw to some extent on governmental or multilateral funds, and some rely to a considerable degree on the contributions of volunteers and part-time workers.

36. Involvement in assistance has also spread to professional organizations in the population field, such as the International Union for the Scientific Study of Population, the International Confederation of Midwives and the International Association of Schools for Social Work. Other organizations, such as the World Assembly of Youth and the World Veterans Federation, are primarily concerned with special target groups. These bodies help mainly through education, information and advisory services on population questions of concern to their affiliates and members.

37. Mass organizations, such as trade unions, co-operatives, youth and women's organizations and other key institutional forces with international responsibilities, are also now beginning to support the development of population policies and programmes, although they do not have population as their primary focus.

38. The IPPF supports member family planning associations in 79 countries. It has been in existence for over 21 years; its annual budget has grown from $30,000 in 1961 to around $30 million in 1973. Its current plans include the setting-up of a clearing-house on teaching aids for population activities in collaboration with UNESCO and UNFPA, as well as arrangements for the distribution of contraceptives through commercial channels.

39. The Population Council, mainly supported by grants from the Rockefeller and Ford Foundations and USAID, had a budget in 1972 of $16.5 million. In 1966, The Population Council initiated an experimental international post-partum programme to provide family planning advice and services to maternal cases at selected hospitals and clinics, with in 1972, included 116 hospitals and clinics in 12 selected developing countries. Attention is now, however, turning from the urban-oriented post-partum programme to pilot projects on the delivery of family planning services to rural areas through maternal and child health networks.[13] The Population Council also provides grants to institutions around the world for research in reproductive biology and contraceptive techniques. It also promotes demographic research and the preparation of country monographs and scientific studies on population matters.

40. The Ford and Rockefeller Foundations have placed emphasis on support for biomedical research with respect to population activities. During the 20-year period 1952-1972, the Ford Foundation committed over $164 million to the population fields, including $89 million for research and training in reproductive biology and contraceptive development. Since the mid-1960s, the Ford Foundation has given increasing support for family planning activities to 26 developing

[12] See references mentioned in paras. 18-28. See also The Population Council, *Annual Report 1972* (New York, 1973); International Planned Parenthood Federation, *Report to Donors* (London, 1973).

[13] The Population Council, *op. cit.*, p. 74.

countries, mainly in Asia and Africa. In Latin America, the emphasis has been on the study of population problems and reproductive biology.

41. Over the period 1965-1972, support from the Rockefeller Foundation on population questions totalled nearly $50 million. The Rockefeller Foundation provides support for biomedical research in fertility control and for studies on the interaction of social and biomedical factors. In 1971, for example, the Rockefeller Foundation gave a joint grant with the Ford Foundation of $5 million to The Population Council for the international programme to follow up new leads in contraceptive research. The Rockefeller Foundation also provides technical assistance for family planning programmes. While both foundations give substantial support to American and some European universities and research centres, programmes aided are devoted largely to population activities of developing countries.

42. In introducing and extending family planning services, the Pathfinder Fund finances a number of projects at the country level and at the same time works through nationals of the recipient countries in order to provide continuity of activities after external funding ceases. OXFAM, a non-operational agency, provides funds for family planning through IPPF or individual country family planning associations. Its sister organization, OXFAM CANADA, also assists family planning activities. The *Japanese Organization for International Co-operation in Family Planning, Inc.*, provides family planning assistance with commodities and audio-visual and other educational aids. A number of other private agencies, such as CARE, Church World Service, Association for Voluntary Sterilization, World Neighbors, World Education, Inc., Family Planning International Assistance, American Friends Service Committee, Family Health Foundation and International Educational Development, support population programmes within the context of their over-all specific objectives and activities.

43. The World Assembly of Youth, in co-operation with its national committees, sponsors national, regional and local conferences or seminars on population, development and family planning and responsible parenthood for students, young workers, rural leaders and youth groups to make young people aware of rapid population growth and the relationship between it and family life. The Population Reference Bureau works to improve public understanding of population questions. It operates within the United States and internationally, but especially in Latin America, to improve channels of communication by distributing information material. The Population Crisis Committee, although not an aid-giving agency, is also active in promoting public awareness of the problems of world population growth and has helped stimulate Governments to provide greatly increased support for international assistance on population.

44. The Asia Foundation has expanded its assistance to Asian institutions to include the population and family planning fields; it is also exploring the ways in which the Japanese experience in family planning can help in dealing with population problems in other Asian countries. The Tinker Foundation supports demographic education and information activities in Latin America.

45. Furthermore, a number of universities and other educational institutions, mostly in the United States of America, but also some in Europe, conduct training programmes specifically oriented towards the needs of developing countries and support research programmes in some of these countries or organize research activities relevant to selected population issues in those areas.

Some characteristics of population assistance

Types and areas of supported activities

46. International population assistance covers a wide range of activities. In the absence of generally recognized definitions and classifications of types of activities, statistics from different donors and programmes are difficult to compare and aggregate, but some over-all orientations emerge from statistics made available by OECD and information available from the largest multilateral agency, UNFPA.

47. Over two thirds, [illegible] per cent, of the total assistance available for population assistance (excluding administrative expenses) were given to support family planning activities of various kinds in [illegible]. About one fifth, [illegible] per cent, was granted to support biomedical research and about one tenth, [illegible] per cent, was for demographic activities (see table 4).

TABLE 4. DISTRIBUTION OF POPULATION ASSISTANCE BY PURPOSE AND REGION, [illegible]

(Millions of dollars)

Purpose	Region							
	South Asia	East Asia	Africa	Latin America	[illegible]	Inter-regional	[illegible]	[illegible]
Demography	2.0	0.1	[illegible]	[illegible]	—	[illegible]	[illegible]	[illegible]
Family planning	47.9	3.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Biomedical	5.1	0.4	4.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL	75.0	3.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PERCENTAGE	41.1	1.9	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]

SOURCE: Organisation for Economic Co-operation and Development, [illegible] January 1974 (mimeographed).

Note: Excluding administrative costs.

48. The largest share of support went to South Asia, namely 41 per cent, and to interregional activities, 31 per cent. Latin America received 16 per cent, and Africa, 10 per cent. On a *per capita* basis, Africa received considerably less than other developing regions —undoubtedly reflecting the fact that the main area of over-all international population assistance is family planning programmes—which are less structured in the African region and for which assistance is less in demand. *Per capita* population assistance is highest in Latin America, nearly double the level of that in Africa.[14]

49. Family planning activities account for a substantially higher than average share of the global total in Asia (90 per cent)—only slightly above the average in Latin America (76 per cent), substantially lower in Africa (59 per cent), and the lowest as regards activities at the interregional level, mainly carried out in North America and Europe (48 per cent). Globally, biomedical research received a substantially higher proportion of resources than average (19 per cent)—at the interregional level (34 per cent), slightly higher in Africa (25 per cent), at average in Latin America (19 per cent) and considerably lower than the global level in Asia (7 per cent). The levels of support for demography at the interregional level (18 per cent) and in Africa (16 per cent) were higher than the global level (9 per cent), and well below average in Asia (2 per cent) and also in Latin America (5 per cent).

50. The distribution of activities supported by UNFPA, as compared with the distribution of total population assistance, indicates considerably more UNFPA support (in 1973) to demography (16 per cent for basic population data, 13 per cent for population dynamics and 2 per cent for population policy). The modest contribution by UNFPA to biomedical research is included with family planning activities, which together amount to scarcely 30 per cent as compared with 90 per cent of the net total of population assistance in general.[15] This pattern of support is a reflection of the importance given by the Fund and the countries to improving the demographic data base for the formulation of population policies and for development planning, particularly in Africa and the Middle East. It also indicates the growing capability of recipient countries to absorb support for demography.

51. In this connexion, some broad regional differences in assisted activities may be mentioned. In Asian countries, where most Governments actively support measures for reducing fertility, international assistance from various sources is mainly for the strengthening of family planning delivery systems and related activities. In Africa, where many countries have never taken a population census, the need for basic demographic data is being met by the African Census Programme, which is supported by UNFPA in the amount of some $16 million to provide experts, training, and equipment to enable as many countries as possible to participate. In Latin America, support is being given from various sources to biomedical and social science research related to population questions and to developing an approach to family planning for health reasons.

52. Most research on human reproduction is still carried out in the United States of America, financed mainly through the Department of Health, Education and Welfare, large foundations and USAID.[16] However, an increasing amount of similar research of various kinds is also being carried out in developing countries, partially through the Expanded Programme of Research, Development and Research Training in Human Reproduction of WHO, which is supported directly by several Governments.

53. On the other hand, the non-governmental organizations are largely involved in support of family planning activities and, especially through the large foundations, in biomedical research. At the country level, international assistance from non-governmental organizations for family planning usually changes over a period of time. At first, and prior to official action, attention may be focused mainly on providing advice and services and on promotional work to create awareness of the problems; financial assistance is often in the nature of "seeding". The subsequent involvement of Governments and the development of major official programmes makes the role of the non-governmental organizations supplementary to that of the Governments. The new area of work for these organizations may include experimentation and innovation, for example, or educational and informational work or the provision of services to sections of the population which otherwise would not be reached.

54. More generally, the pattern of population assistance shows increasing emphasis on operational activities, training and general programme support. In recent years, large-scale funding has become available to some country programmes—bilaterally through the United States, and multilaterally through UNFPA and the World Bank—for example, in India, Indonesia, Pakistan, the Philippines and Thailand. As a result, a large proportion of total assistance is concentrated in relatively few countries. The importance of training as such in the flow of assistance is clearly indicated by the allocations made by UNFPA over the period 1969-

[14] A recent study by the International Planned Parenthood Federation (IPPF) on its distribution of assistance for family planning programmes also shows that the regional distribution of funds was not closely related to need (as indicated by high birth rates) or to population size. About 6.2¢ *per capita* were granted to the Caribbean area, 7.9¢ to Latin America, 5.5¢ to South-East Asia, 4.9¢ to the Middle East and North Africa, 3.3¢ to Africa and only 1.5¢ to the Indian Ocean area (see C. Howell and G. Varky, *International Funds for Family Planning, Preliminary Report* (London, IPPF, 1973)). All data based on funds committed in 1971 rather than actual disbursements.

[15] United Nations Fund for Population Activities, "Annual Report, 1973".

[16] In a more refined system of statistics, some of this research in the developed countries may be excluded or shown separately from population assistance totals.

1973, when one third of all its funds were for that purpose.[17]

55. The recent trend has been towards an increase in the proportion of population assistance going into the area of family planning Indications are that this trend may continue for the next few years. From 1971 to 1972, support for family planning increased by 37 per cent with a similar percentage increase for biomedical research, while there was no increase (and, in fact a slight decline) in the assistance granted in the area of demography. The Fund maintained the proportion of its resources going to family planning in recent years, taking into account the fact that in its earliest stages it devoted a large share of its resources to programme development and support for developing the capabilities of executing agencies in the United Nations system. The Fund's Work Plan for the period 1974-1977 indicates, however, a growing commitment to family planning, especially within maternal and child health care. This is indicated by an estimated increase in the share of the total project budgets of the Fund from 32 per cent in 1974 to 50 per cent in 1977 In the fields of communication and education which will, at least in part, be in support of family planning services, some increase is expected in its share of the total from 12 per cent in 1974 to 16 per cent in 1977.

Terms of assistance

56 At first, all population assistance was given on a non-reimbursement basis. As with other development assistance, it was sometimes tied to procurement in the donor country, but this practice, never popular with recipient countries, has decreased. Today, population assistance is not usually so tied.

57. All assistance provided by UNFPA is in grant form. The Fund does not prescribe any particular form of assistance or approach but does provide assistance for population activities which contribute to economic and social development

58. The entry of World Bank assistance in the form of long-term loans has grown in importance in the population sector. "Soft loans" available to the least developed among the developing countries are interest-free over a period of 50 years with merely a small service charge being applied.

59. It is likely that in the future an increasing amount of population assistance will combine grant and loan funds in ways that will permit larger, more flexible and better co-ordinated programmes of external assistance. The mechanics of developing a co-ordinated approach which would permit the simultaneous use of grants and loans must still be worked out, but it is apparent that the lack of technical support (which comes largely from grants) can nullify the benefits arising from infrastructure development (funded from loans) and vice versa

[17] United Nations Fund for Population Activities, *Annual Report 1969-72, idem*, "Annual Report 1973".

60. The trend also appears to be for donors to commit support over a longer term, though actual transfers of funds are normally made on an annual basis in the case of grants. The comprehensive country agreements negotiated by UNFPA and a number of Governments are now made for a period of up to five years The recipient countries find that longer term funding eases some of the problems of absorbing assistance It is, for example, easier to train personnel and build up institutional support for continuing programmes when longer term commitments are made.

Approaches to assistance

61 The initial approach for assistance to country programmes is normally made by Governments themselves. Arrangements for interregional, for which nearly one third of total population assistance is allocated (see table 4), and regional programmes are generally made jointly by international agencies and Governments With non-governmental organizations, the approach is more flexible since they can act largely outside official channels; the initiative often comes from a private, national or local organization, university or research institute in the countries seeking aid.

62 Requests for assistance are subject to the usual technical co-operation criteria Decisions are made regarding the need for the activity, its technical merit, possibilities of implementation and availability of funds. In the formulation of national population policies, and particularly in regard to family planning programmes, two major additional guiding principles apply—first, respect for the sovereignty of each country, and, secondly, respect for the private personal decision of each couple on the size of the family and the spacing of the children it wishes to have

63. The importance of these principles is generally recognized by all members of the donor community. For example, USAID has laid down guidelines by which assistance to population programmes in developing countries is provided only upon the request of the recipient country, and participation by the citizens in any assisted population programmes must be voluntary.[18] The United Nations system is guided by mandates under which population assistance is given only upon request of countries, and the rights of individuals to make their own decisions on population matters are safeguarded. Assistance for important activities, including training, research, surveys and conferences, at the interregional and regional levels are governed by decisions of the intergovernmental legislative bodies

64. Organizations within the United Nations system encourage countries to choose their own approach according to their own specific needs. There is no fixed model for assistance, but a flexible response to different needs is generally applied. Recipient Governments and organizations are expected to demonstrate clear and

[18] United States Agency for International Development, *op cit.*

realistic population objectives and the determination and capacity to implement them.

ASSESSMENT OF INTERNATIONAL ASSISTANCE

Current problems and constraints

65. The rapid growth of development assistance in general has recently been subjected to a set-back, and there are indications that it may tend to level off and reach a plateau in terms of real purchasing power at least for the time being. The reasons for this development include such factors as inflation and balance of payments problems, especially in the traditionally major donor countries; the changing pattern of world trade; the continued large budgets for armaments; the disenchantment, at least in some countries, over political relations between recipient and donor countries; criticism about the effectiveness of the aid process and limited or falling support for foreign aid programmes by the public in major donor countries.

66. Some of the criticism made of general development assistance also applies to population assistance. While managerial processes appear to have a built-in tendency to attract more criticism than praise, it is of utmost importance that all relevant criticism of population activities be examined so that the effectiveness of programmes can be improved. The long time-span of some population activities especially emphasizes the need for, and importance of, effective management. In order to maintain and intensify the faith and support of the donor community, it is essential to review, assess and demonstrate advances made and results already achieved.

67. To some extent, the problems with regard to population assistance may in part be ascribed to the rapid rise in the volume of assistance, to the large number of donor agencies and to the variety and novelty of the assistance machinery in donor and recipient countries alike.[19] However, to date only limited attempts have been made to evaluate the successes—and failures—of assisted population activities, and to come to grips with the problems that might emerge from such evaluations. Experience gained in tackling the problems of donor management and recipient absorptive capacity in development activities in general has not yet been sufficiently applied in the population fields.[20]

68. Some of the problems and constraints, along with some suggested means of improvement, mainly from the recipient side, are briefly discussed below. This is not intended to be a comprehensive presentation, but is based mainly on discussions that took place at two recent international meetings in which both donor and recipient countries participated.[21]

69. The lack of basic data required for planning and the absence of full knowledge and appreciation of the problems and characteristics of the recipient countries, within the recipient country particularly in the social context in which policies and action programmes should be formulated and implemented, are often handicaps to donor agencies. The absence of a comprehensive "philosophy" or a strategy in the fields of population—including family planning—often makes it difficult for donors to provide effective assistance.

Problems mainly within donor responsibility

70. Recipient countries sometimes complain that population assistance is not focused sufficiently upon the needs and priorities of the developing countries concerned. They suggest that the donors not use assistance as a lever to speed up the acceptance of any particular policy or approach. They say that assistance should be given to countries without, as well as those with, official population policies. They feel that they should be given clearer information on the attitudes of the different donors and the types of assistance available from them. They point out that donor agencies often delay proposed programmes by suggestions for changes or additions which may be of minor significance. And they say that aid agencies, because of the constraints on them, often fail to adapt their responses to different situations (for example, if there are no trained people or the necessary infrastructure is not already available in the recipient country, the assistance programme should be so modelled as to fill that gap).

71. Some recipient countries have been concerned with the considerable delays which have occurred in the delivery of equipment and supplies. Standardization of equipment and supplies would help, but recipient countries should also be encouraged to manufacture their own. Steps have been taken by UNFPA to enable UNICEF to establish stocks of vehicles and contraceptive supplies for delivery without delays in response to requirements in supported programmes.

72. Some recipient countries have requested simplification and co-ordination of operating procedures.

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[19] See H. Gille, "Population", in R. Symonds, ed., *International Targets for Development* (London, Faber and Faber, 1970), pp. 72-80; Organisation for Economic Co-operation and Development, *The Constraints on Population Activities and the Problem of Absorptive Capacity: Proceedings of an Expert Group Meeting* (Paris, 1973); *idem, An Assessment of Family Planning Programmes* (Paris, 1972); United Nations Fund for Population Activities, unpublished findings of a Seminar on the Management of Family Planning Delivery Systems at the Local Level, July 1972; *idem, Work Plan 1972-1975* (New York, 1972), paras. 132-138.

[20] Organisation for Economic Co-operation and Development, *Development Co-operation: Efforts and Policies of the Members of the Development Assistance Committee*, 1972 Review (Paris, 1972); *Partners in Development*, Report of the Commission on International Development (New York, Praeger, 1969); *U.S. Foreign Assistance in the 1970's: A New Approach*, Report to the President from the Task Force on International Development (Washington, D.C., Government Printing Office, 1970); R. C. Nairn, *International Aid to Thailand: The New Colonialism?* (New Haven, Connecticut, Yale University Press, 1966).

[21] United Nations Fund for Population Activities Seminar on the Management of Family Planning Delivery Systems at the Local Level, July 1972; Organisation for Economic Co-operation and Development, *The Constraints on Population Activities and the Problem of Absorptive Capacity*.

Other impediments to effective operations mentioned are too frequent (and too many): fact-finding, exploratory, appraisal, evaluation and other types of missions and visits which take up excessive time and resources of local personnel in recipient countries.

73. Another view is that closer donor co-ordination may be difficult to establish and may even be undesirable. Some recipient countries may even prefer the different approaches offered by different agencies. Some other countries may prefer co-ordinating the arrangements of activities of United Nations technical assistance from a single source of funds.

74. Some recipient countries are concerned about unduly complicated reporting procedures and funding controls. Donor agencies usually point out that they are obliged to report fully to their Parliaments for financial authority to use funds; but steps have been taken by some donors, including the United Nations system, to simplify reporting procedures.

75. There are divergent views on the roles of local representatives of donor agencies. Many recipient countries prefer them to have sufficient authority to approve operational programme details. Donor agencies, however, find a tendency for local representatives too often to exceed the limits of their authority. The UNFPA has assigned local co-ordinators, especially to support comprehensive country programmes. It has been suggested they might also act for other donor agencies or at least provide a focal point for the exchange of information and the co-ordination of local activities

76. Donor agencies frequently have difficulty in finding and placing appropriately qualified foreign advisers. A number of recipient countries report dissatisfaction with their quality, attitude and roles, pointing out that in some cases the adviser appeared more interested in pursuing his own research, and, consequently, the time available for his assignment was affected "Consultant" or "adviser" are more appropriate terms to apply than "expert", it is felt. More use should be made by donors of the expertise available in many of the recipient countries themselves and more attention should be paid to local training Donors should not consider foreign personnel a necessary part of any project in the field, nor use them as reporting officials.

Problems mainly within recipient responsibility

77. Lack of commitment or low priority given to population policies and programmes by ministries or other Government departments and at times by the Government itself has, on occasion, been a major constraint upon donor assistance. Commitment can be strengthened by long-term population plans which clearly evidence their implications for the relevant sectors of Government.

78. Health ministries generally have responsibility for family planning programmes, and this sometimes leads to low budgetary priority for the programmes. An interministerial co-ordinating body may be required to ensure that all relevant sectors shall make the maximum contribution of their particular expertise within the over-all programme.

79. A major constraint to the capacity of recipients to absorb assistance once a commitment is made is the lack of the means to organize an effective programme. Inadequate basic population data cause serious difficulties in planning and in assessing results. Weaknesses in supporting institutions are reflected in poor delivery, particularly in rural areas Shortage of qualified personnel may affect progress at all levels. In a survey carried out recently by IPPF among its member associations and other national contacts, of the elicited responses which illustrated the inhibitions on full acceptance of family planning, the lack of appropriately trained staff for performing essential functions was the barrier most often cited [22]

80 The material available to OECD and UNFPA, however, points to some substantial progress in tackling some of the administrative and other obstacles over the past four years There are fewer problems over tied aid and the delivery of supplies Co-ordination machinery has been improved Donor agencies more often enter into longer term commitments. The widening of the approach to family planning beyond the health sector and the growing support for comprehensive country programmes have eased problems of absorptive capacity In particular, UNFPA and other organizations in the United Nations system are taking further steps to improve the management of population activities under their responsibility. Increased efforts are being made to expand training facilities and to develop new training schemes in various fields relevant to population activities, including interdisciplinary training

Results

81. Only a partial, very general picture can be given of the achievements of international population assistance. No over-all survey is available from which a meaningful analysis could be made. Yet, it is known that there has been impressive growth of the international resources committed, of the number of projects and programmes supported and of the range and types of activities promoted. [23] Moreover, the quickly growing demand from the third world for population assistance is clear testimony of needs felt and benefits expected. Particularly in Africa and Latin America, population activities are being introduced or extended where only five years ago they existed on a very small scale or not at all In Asian countries, they are being built up on the firm base of existing commitments of international assistance.

82. In financial terms, the over-all contribution of international assistance is small compared with the actual costs of the population activities they support

[22] S C. Huber, *World Survey of Family Planning Services and Practice* (London, International Planned Parenthood Federation, 1973), p 14.

[23] For a summary of recent activities, see United States Agency for International Development, *op cit.*

in the developing world. International assistance in any field can never be—and should never be—more than a marginal addition to the development efforts of recipient countries. International population assistance received by India was estimated to constitute about 10 per cent of the total cost of the national family planning programme in 1970—which is a somewhat higher proportion of aid to total resources than in other sectors. In a number of other countries, particularly smaller countries, population assistance is probably a somewhat higher proportion of total costs. In so far as organized family planning programmes are concerned, it has been estimated that in 1971 about one third of the total cost was provided through international funding. [24]

83. There is no question, however, that the role and significance of international population assistance go far beyond the often comparatively modest financial contributions committed to it. It constitutes, in many cases, an essential element and a spur to national efforts and to enlisting local resources. Many of the activities supported would probably not be taking place at all without the interest and contributions of donor Governments and agencies, for example, in the fields of fundamental research in human reproduction, the development of new methods of fertility regulation, intercountry exchange of research and operational experience in population programmes and the high-level training of personnel at regional institutions as well as other training abroad. The involvement of international organizations, in particular, has had a considerable effect by calling attention to the importance of various population activities and by encouraging countries and institutions to participate in common efforts, to adopt policies and programmes which have been found useful elsewhere and to undertake demonstration and pilot projects, the results of which can have broad application. Very often, international assistance provides the essential spark needed to overcome reluctance at the local level to expend the necessary financial, human and material resources for worth-while activities. The African Census Programme is a case in point under which a number of developing countries are, for the first time, involved in taking a population census. Sometimes, the will and the necessary local sources may be there; but crucial inputs of equipment and supplies cannot be obtained due to foreign exchange difficulties unless international assistance is made available.

84. It is an extremely difficult—if not impossible—task to identify and measure the impact of international assistance in developing countries. Inputs originating from abroad are usually interwoven with local inputs of various kinds and the effects of the former can hardly be measured as separate from the effects of the latter. Instead of attempting to estimate the effects of international population asssitance, some general observations about the impact of the programmes they support are made below.

85. Since the majority of population assistance is provided for family planning activities, far more questions are being asked about their impact—so much so that the benefits of the support for demographic statistics and demography and activities other than family planning are not sufficiently stressed. The provision of basic demographic data through the establishment of population census machinery and vital registration systems as well as the development of skills acquired through demographic training is of great importance to many sectors of Government. Assistance to aid in the formulation of population policies is also of great significance in many countries since such assistance enables them to set realistic targets for population programmes and in other sectors.

86. In some areas, such as research, the benefits may only appear in the long run. Increased support for research in reproduction and fertility control enhances the possibility of developing a variety of new, safer, more effective and more acceptable methods of fertility regulation within a shorter period of time. Further improvement in contraceptive methods applicable to large-scale programmes in developing countries could, in due course, have consequences of decreased fertility out of all proportion to the resources currently available for such research.

87. Problems over the availability of data arise in assessing the results of family planning programmes. Considerable time periods may be necessary to measure the results either because of implementation difficulties in the early stages or because early success in gaining acceptors of contraception may not be sustained. It may also be difficult to separate the effect of programmes from other factors, such as general modernization trends.

88. A recent review finds national family planning programmes uneven in execution and in impact. Encouraging developments are reported in Colombia, Iran, the Philippines and Thailand. Relatively substantial fertility declines have apparently been due in some part to family planning programmes in Fiji, Hong Kong, Mauritius, the Republic of Korea and Singapore. The range of programmatical effects in terms of annual acceptors of contraception is from about 10-15 per cent of married women of reproductive age in areas with a strong programme in a favourable setting to about 2 per cent or less in areas with a weak programme in an unfavourable setting. As yet, no method exists for stating beyond a doubt how much effect a family planning programme has on the birth rate. [25] This applies even more to the effect of various components of a programme such as motivation and communication activities.

89. Important results are reported for the internationally supported post-partum programme. By the end of 1972, the acceptance rate of contraception or steril-

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[24] C. Howell and G. Varky, *op. cit.*, p. 17.

[25] B. Berelson, *Status Report on Population Developments* (New York, The Population Council, 1973), pp. 20-22.

ization was 37 per cent of the entire obstetrical and abortion case load at the hospitals and clinics participating in the programme since 1966. Results may, however, be more difficult to achieve at the next stage as the emphasis of the programme is shifted from urban to rural areas.[26]

90 Uneven results are reported in terms of meeting national demographic targets in 25 developing countries with programmes designed to reduce birth rates. While the targets may not always be realistic, seven countries were found to be on target, but in six, progress has been poor. In six other countries, review is premature, and in five, evaluation is not possible for technical reasons. The comparatively poor results, at least in relation to targets in the two largest countries with the longest programmes, India and Pakistan, apparently support the view that economic and social change may have to occur before family planning programmes can have a significant demographic impact. In cost/benefit terms, however, based on estimated returns for each averted birth, family planning programmes are found to be highly profitable investments.[27]

91. In conclusion, it is clear that population assistance has been a significant factor in the recent upsurge in population activities in the developing world. It is not possible, in general, to demonstrate definite effects upon population trends, but in any case, such results could not be expected in the short span of a few years. Support, in particular for the training of personnel, for research and evaluation, for building of institutional structures and for related education and communication activities, can be expected to have important multiplier and long-term benefits although they may be difficult to measure in quantitative terms. Sometimes the assistance provided constitutes a comparatively high proportion of initial costs, such as demonstration and pilot projects, but over the duration of the projects the proportion is considerably reduced and the results of the projects may be felt long after their completion.

92. At the same time, it must be recognized that international assistance in support of population activities, particularly family planning programmes, has not yet had the impact one might have expected, especially when set against the need for such activities. Further- [illegible]

[illegible] the developing world The large majority of developing countries need and want international assistance to facilitate and expedite the process of dealing with their population problems

[26] The Population Council, *op. cit*, pp 73-74

[27] D. Nortman, "Status of national family planning programmes of developing countries in relation to demographic targets", *Population Studies* (London), vol 26, No 1 (March 1972), pp. 9-13.

Future of international assistance

Estimated needs

93. It is a difficult, if not an impossible, task to estimate the needs for international population assistance. Much depends upon the criteria to be applied with regard to the types of population activities which are required, the extent to which support from external sources is needed, the availability of local resources and the absorptive capacity of the developing countries. Few attempts have been made to estimate the requirements for and costs of population programmes in developing countries irrespective of the source of financing

94 The UNFPA has attempted to make estimates of the costs of developing comprehensive population programmes to meet various ideal targets or goals such as to provide information and services on family planning for the entire population in the developing countries, to conduct a complete population census in all countries at least every 10 years, to establish vital statistics registration systems with a coverage of at least 90 per cent, to provide population education in and out of schools, to train personnel required for various population programmes, and to support research required for planning and implementing effective population programmes, including operational research and development of improved contraceptive techniques. The estimates mainly cover activities designed to affect fertility and population growth directly or indirectly, including family planning, maternal and child health, communication and motivation and population statistics and analysis, but leave out of consideration other activities related to morbidity and mortality, population distribution and migration and the broader socio-economic measures affecting population trends.

95. The estimates are generally limited to requirements in the developing countries except those in the field of basic research, in particular on human reproduction and fertility regulation, where the global needs rather than those of any particular group(s) of countries have been considered The cost estimates are aggregate total costs and not additional costs over and above expenses [illegible] in ongoing programmes. The estimates [illegible] on a *per capita* basis and [illegible] *merely rough* [illegible] magnitude of the [illegible] involved based [illegible] prices.

96. An [illegible] annual cost for [illegible] relevant [illegible] is estimated [illegible] *per capita* [illegible] million for the [illegible] [illegible] The provision of [illegible] and [illegible] child health services [illegible] requirements[28] [illegible] at $0.65 *per* [illegible]

[28] [illegible] and B. Berelson, [illegible] child health [illegible] *Studies in* [illegible]

thirds of the total. Other organized family planning services through various other channels would require around $0.10, and unorganized services, a similar amount. Population education activities in and out of schools are estimated at $0.05 *per capita*, communication activities at $0.05, training of non-service personnel at $0.04, collection and analysis of population statistics and studies on population dynamics at $0.12 and research on human reproduction and fertility regulation at $0.06 *per capita* per annum.[29]

97. An independent estimate of the costs of a population programme for developing countries, excluding China, assuming an increase in contraceptive practice from the current level of about 10 per cent to 50 per cent in 1990, concludes that the total estimated annual costs of a world-wide population programme would be $1.2 thousand million in 1980 and rise to $2 thousand million in 1985. The totals include costs of distribution systems, population censuses, information and education, research and evaluation.[30]

98. As it stands now, no accurate estimate can be made of the need for population programmes in developing countries and the estimates provided here may not take fully into account several concomitant needs in the economic and social fields which would have to be strengthened if the programmes were to have their maximum impact.

99. The fact remains, however, that the estimated total of around $220 million available for population assistance from international sources in 1973—excluding the contributions of Governments, non-governmental organizations and individuals in the recipient countries—amounts to a small proportion, probably less than 10 per cent of total estimated needs for external and internal resources for population activities.

100. The UNFPA forecasts a substantial increase in the demand upon its resources within the next few years. Requirements for assistance are expected to increase from $47 million in 1973 to $86 million in 1977—nearly a doubling of the total annual project budget. The entire increase is for meeting the direct needs of developing countries, while support for regional and interregional activities carried out by organizations in the United Nations system will be maintained at the current level (allowing for inflationary cost increases). This forecast of needs takes into account the commitments already made to ongoing projects for the coming years as well as replies received from some 60 Governments in response to a recent UNFPA inquiry made about national requirements for assistance from the Fund, taking into account the viability of the activities proposed and the experience gained with regard to delayed project formulation and implementation.

Future resources and programmes

101. While the total of population assistance has grown rapidly in recent years, there are indications that this growth might not continue unabated—at least for the time being. The main source of funding, from Governments, increased only slightly from 1972 to 1973, from $163 million to $180 million—hardly more than what was absorbed by inflation. There was, in fact, a substantially lower increase in governmental contributions in 1972/73 compared with the increase in 1971/72—the latter amounting to $41 million. The most significant factor was the temporary halt in the upward trend in recent years of contributions on the part of the largest donor, the Government of the United States (see table 2). This Government's resources for population assistance actually declined from $125 million in 1973 to $112.5 million in 1974 (funds available for programmes were further reduced in view of some administrative charges amounting to around $8 million). Some of the major foundations, such as The Population Council, Ford Foundation and Rockefeller Foundation, have also reduced in absolute terms funds devoted to population activities in 1973 as compared with 1972.

102. The important question is whether other major donor Governments will continue to increase their contributions substantially as they have in recent years. On the average, population assistance constituted only about 2.3 per cent of total official development assistance and 0.008 per cent of the total gross national product of donor countries in 1973. Many donors may be prepared, within their total development assistance budgets, to give higher priority to requirements in the fields of population if they are convinced of the need for, and the usefulness of, such programmes. It should be appreciated, however, that an increase in assistance for population activities should not be brought about at the expense of assistance to other vital sectors of development.

103. The future prospects for increased population assistance, therefore, become much more dependent upon the extent to which population programmes can be made more effective and the extent to which the management of aid, both on the donor and recipient side, can be improved to overcome current criticism. Some suggestions for improvements and changes are briefly outlined below.

Improvements in programme formulation and implementation

104. Various steps can be taken by both donors and recipients to improve the effectiveness of aid-supportable activities and programmes, thereby making them more attractive to international funding. The stage has been reached in many countries with established programmes where attention needs to be directed as much towards project accomplishments and evaluation as to the development of services.

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[29] United Nations Fund for Population Activities, "Cost estimates of a comprehensive population programme", 1974, unpublished.

[30] W. H. Draper, Jr., "A population programme", 1973 (mimeographed).

105. Many programmes suffer from ill-defined aims and purposes Concrete objectives and targets should always be clearly established The recipients should take steps to provide better statistical and other data as a part of any major activity. Detailed planning of projects should be made before population assistance is committed to minimize problems of implementation and the unnecessary blocking of funds in the pipelines Appropriate planning would include full understanding of the responsibilities of all the parties involved on the donor and recipient sides throughout the life of the project and the preparation of time-tables for the various inputs to be made available and the phasing of the various activities. Frequent evaluation of results obtained and problems encountered, preferably with the participation of technically competent representatives of the major donors concerned, and at various stages of programming, can contribute greatly to overcoming any scepticism and may ensure continued or even increased support.

106. Steps should be taken by donors to improve the implementation of assisted activities Long delays in the recruitment of advisers, the purchase of equipment and the provision of supplies are well-known causes for frustration among recipients Greater reliance should be made, whenever possible, upon locally available expertise, particularly in large countries where it is often available and may be more suitable and considerably less expensive than foreign advisers Donors providing equipment and supplies should, in so far as possible, establish stockpiles to avoid delays in delivery or call upon other donors who may have made such prior arrangements. Furthermore, direct project implementation by the recipient Government or an appropriate local institution in the recipient country may be more effective and less costly than using a donor agency for project execution, except when technical guidance is required and not locally available. The UNFPA has already taken steps in many of these directions to improve the implementation of its supported activities

Improvements in management and co-ordination

107. There is no question that the management and implementation of the aid process by donor agencies needs to be improved A common and simplified management system may, in some cases, be applied by donors to ensure effective implementation. Co-ordination between donors should be strengthened in collaboration with the recipient countries most directly concerned by regular exchanges of information on needs for assistance, experience gained and results achieved. The UNFPA has recently taken the initiative in convening *ad hoc* meetings of interested donors which are in the process of developing comprehensive country projects. Initial steps have also been taken to exchange information between and among donors on requests received for funding of the same projects. Further steps towards such co-ordination of funding may be taken. At the country level, the recipient Governments should be encouraged to take initiatives and to convene meetings with donor representatives in order to keep them informed of relevant programme developments and funding, and, at the same time, to solicit better information on funding prospects

108. Donor agencies and recipient countries together might develop guidelines on how to assess and demonstrate the impact of population assistance and how to best evaluate the effectiveness of activities being supported. There is an urgent need for identification of the criteria to be applied in evaluation and for the development of measurement techniques to be applied.

109 More and better statistical data are required to provide coherent and reliable information on the characteristics of and trends in population assistance. A number of difficulties are currently involved in the collection and use of financial data on assistance Some donors report disbursements, others, commitments. Some use calendar years as the reporting period, others, fiscal years—not identical to calendar years Substantial funds are channelled from one donor to another, leading to problems of "double counting" those not always being adequately reported. Differences of definition and of classification of types of activities often result in inconsistencies and difficulties in interpretation of such data Agreement should be reached among donors concerning improvements for reporting and presenting financial data.

Reorientation of programmes

110 The modest results obtained in many national family planning programmes suggest that alternative approaches should be fully explored for achieving established goals It would appear that there can be no generally applicable over-all approach or content for family planning programmes. They must be sensitive and responsive to local conditions and needs Available knowledge about social, cultural and administrative factors is apparently not always sufficiently considered in programme formulation and implementation Where necessary, local studies should be supported to provide this required information

111. More attention, no doubt, needs to be given to non-clinical approaches, including the distribution of contraceptives through commercial and other channels than traditional health services A new programme in this area, launched by IPPF, should demonstrate to Governments and non-governmental organizations in developing countries the possibilities which exist in [illegible] available and appropriate methods of fertility regulation While encouraging the expansion of the current distribution schemes, support should be given to simplifying the procedures as much as possible.

112. So far, large parts of family planning programmes have concentrated on increasing the delivery of services In many countries, greater attention should

be given in the future to ways of encouraging the demand for such services by strengthening motivation in individual families as well as at the political leadership level. Such encouragement would, however, only be appropriate if current demands can be adequately met and provisions be made for effectively meeting additional demands. Efforts to strengthen motivation are particularly difficult but important where large families still represent a rational response to economic and social conditions.

113. In spite of the current trend towards more assistance to family planning, far greater attention than is currently paid should be directed to the support of other action programmes, such as changes in marriage patterns and the influence of employment and education upon fertility, as well as programmes affecting migratory movements to bring about a better balance between human resources and economic opportunities. Considerable research is needed in support of such activities.

Conclusion

114. A strategy for population assistance should be developed involving the broader elements of national population policies as these elements relate to other social or economic areas which can support or supplement population objectives, such as health, employment, education, migration and urbanization. Those social and economic policies and measures which can help to accomplish population goals within the broad context of development should be fully explored. A conceptual framework should be developed for a truly integrated approach to the three crucial problems facing most developing countries—poverty, population and environment. The optimum mix of the various activities and their costs should be studied in particular settings and with reference to various target groups. Donor agencies should assist recipient countries in carrying out such tasks and readily participate in their funding.

115. There is, of course, no way of knowing what the level of international assistance to population activities might be five or 10 years hence. Demographers appear to be able to forecast population growth with a reasonable degree of accuracy, and thus one can assume that the world population will probably double between now and the end of this century. Unfortunately, there are too many variables involved for economists or financial experts to forecast with any degree of accuracy future levels of international assistance to population activities.

116. It would appear safe, however, to predict that the level of international assistance will never be equal to the job that needs to be done, nor will it be equal to either what the countries requesting assistance want done or what the donor agencies themselves want to do. Thus, priorities will, of necessity, have to be established by all those involved in international assistance to population activities—by the recipient countries and by the donors. Co-ordination and consultation among all parties is clearly the first priority. Equally important, however, will be the recommendations put forth by the World Population Conference and any guidelines that it may lay down for both recipients and donors.

117. The fact of the Conference, coming as it does during World Population Year, when the attention of Governments and citizens around the world is focused on population issues, cannot help but place tasks, objectives and obligations of both recipients and donors in clearer perspective for all those involved in population activities.

ANNEXES

Annex I

REPORT OF THE SYMPOSIUM ON POPULATION AND DEVELOPMENT

INTRODUCTION

1. The Symposium on Population and Development was held at Cairo from 4 to 14 June 1973. It was one of a series of symposia held in preparation for the World Population Conference, 1974, as recommended by the Population Commission at its sixteenth session [1] and endorsed by the Economic and Social Council in its resolution 1672 (LII)

2 The Conference, as endorsed by the Economic and Social Council in its resolution 1484 (XLVIII), is being organized as a meeting of Government representatives It will differ from the World Population Conference, 1954, held at Rome, and the World Population Conference, 1965, held at Belgrade, which were technical meetings Therefore, a series of scientific activities was planned in preparation for the World Population Conference, 1974, to identify and clarify critical problem areas at the technical level.

3. Among those pre-Conference activities were four symposia on population and development; population and the family; population, resources and environment, and population and human rights Those were technical meetings of experts participating in their personal capacity.

4. The Symposium on Population and Development, relating directly to the second of the substantive agenda items of the World Population Conference, 1974, on "Relations between [illegible] meeting The meeting had before it technical papers prepared by experts, by the United Nations Secretariat and by the specialized agencies specifically for the Symposium, and some draft background papers prepared for the Conference.

5. The meeting was opened by Mohammed Abdul Kader Hatem, Deputy Premier for Culture and Information. Sayed [illegible] the experts participating in the Symposium He observed that as a meeting of experts prior to the Conference, the Symposium offered the opportunity to bring the talent and judgement of [illegible] Conference and Governments in their policy- and decision-making

6 At its first session, the meeting elected V. Urquidi as Chairman and Ester Boserup and I Selim as Vice-Chairmen. L. Tabah was Director of the Symposium and Mr. Gobba was Co-Director. H Leibenstein was designated Rapporteur, Kath[illegible] J van den Boomen was Technical Secretary.

7 The meeting adopted the agenda reproduced in the *appendix to the present report*

8 Among the major issues of international concern dealing with current and prospective world problems and challenges, the theme of the Symposium and this report—the interactions between economic and social development and population—merited a prominent place In dealing with that question, a broad framework and perspective had been adopted by assembling the scientific information available; by delineating the different approaches to understanding the basic issues, by recognizing the basic principle that solutions to the wide range of associated problems were conditioned by variations in socio-cultural conditions, political systems and so forth, by noting differences in points of view among persons representing different disciplines and parts of the world, but most importantly, by bringing together the rapidly growing consensus on the most urgent questions The consensus on substantive matters, which transcended differences in terminology and degrees of emphasis on different aspects and details, was of special value

9 Although full agreement on those complex issues could not be expected among participants coming from different regions, political backgrounds and professional experience, a convergence of ideas on basic themes was evident throughout the debate That convergence, found also in the documentation for the Symposium, is reflected in the current report It was particularly significant because it represented a greater degree of consensus than had been usually found in the past

10 [illegible] term capital funds, transfer technology and encourage innovation in support of economic growth and social change. Progress along those lines was the major objective of the International Development Strategy for the Second United Nations Development Decade. Efforts to accelerate the development of the poorer countries and to reduce international inequalities among countries are essential for the attainment of the well-being desired by all countries and for social peace and order in the future world, just as social justice, equality for opportunity and the satisfaction of basic needs were indispensable for the harmonious and undisturbed development of any society as well as for individual achievement Those objectives were interrelated with population trends and policies as stated in the International Strategy for Development

11 Recent decades, especially the last two, were periods of man's history during which population growth had accelerated to the point at which it had become a major concern While concern with population growth was hardly new, it had become of world-wide dimension as the decline of mortality, in very short periods, combined with the maintenance of high birth rates, had brought about an unprecedented increase in numbers. To state some figures, not with a view to raising apocalyptic

[1] See *Official Records of the Economic and Social Council, Fifty-second Session, Supplement No 3*, para. 166

fears, but to place the dimensions of the problem in perspective, there was a clear prospect that by the end of the century, world population would reach from 6 thousand million to 7 thousand million, of which number well over 75 per cent was expected to live in countries currently classified as developing. Under some assumptions, world population might be of the order of 11 thousand million at the middle of the twenty-first century. Those prospects undoubtedly presented problems for the future development of the countries of the world.

12. The policy concepts of and the theoretical approaches to the issue of population growth and development could be found within the limits set by two extreme positions. The first of those was the view that the current high rates of population growth were already exerting an unfavourable influence on social and economic development. On the other hand, there was the view that, given the presence of certain social and economic policies, a larger population could be beneficial for development. However, there was growing support for an intermediate position held by those who recognized the potential benefits from population growth, but who also saw in high rates of population increase a serious impediment to socio-economic development even in areas which would benefit from a larger population attained more gradually.

13. The degree of concern with the economic and social implications of the high rates of population growth varied according to the size of the country, natural resource endowment, initial income *per capita*, industrial structure, education and skill levels, possibility of participation in world markets, and, not the least, cultural, social and political factors. The perception and evaluation of those problems also differed considerably, especially in respect of implications. It was important, in that context, to recall that the time dimension of population change was greater than that for other economic and social change.

14. There was a growing body of scientific evidence on the impact of accelerated economic development and social change on population variables. The record suggested that advances in knowledge and technology applied in the fields of medicine and public health were, to a large extent, responsible for the high rates of population growth through a rapid reduction of mortality, especially among infants and children. At the same time, *per capita* income had increased, contributing also significantly to lower mortality rates. Food supplies had become more certain and famines less frequent in the current century. In turn, a number of related influences, such as changes in educational attainment, the rising status of women and shifts in familial roles among those participating more fully in the process of change had led in varying degrees to declines of fertility. It was also widely agreed that the decline of the high fertility levels, still prevailing among large sectors of the population which had maintained traditional patterns and a traditional way of life and, as a consequence, traditional fertility levels, was most likely to occur in response to socio-economic development.

15. The demographic evidence compiled by the United Nations, coupled with the economic and social information, indicated a considerable diversity of situations in the various regions of the world. In the developed countries, both free enterprise economies and centrally planned economies, current rates of population growth were low and in some instances were even causing a preoccupation with a need to stimulate birth rates. In developing countries, current rates of population growth were, for the most part, high. A growing number of those countries, socialist and non-socialist, were adopting policies to initiate fertility decline or to reinforce existing trends in that direction.

16. There were also significant differences between the three major developing regions of the world: Africa, Asia and Latin America, as well as within those regions. It was by no means evident from the statistical record that countries with lower rates of population growth had developed more rapidly or efficiently, or that high rates of population increase had been inconsistent with development at a fairly high pace. Whatever the precise demographic patterns, economic growth appeared to have resulted from a wide variety of factors, including favourable situations with respect to international trade coupled with purposeful domestic policies, institutions that encouraged the introduction of innovations, an energetic population and the introduction of social improvements. In turn, developing countries that had stagnated or lagged economically had done so for reasons not necessarily connected with a particular rate of population growth. The absence of a close statistical correlation between population growth and socio-economic development was not surprising. It was explained by the two-way relationship between the two, by the multiplicity of factors affecting development and by the long-term nature of the influence exerted by population trends. It was, nevertheless, clear that certain aspects of development were adversely affected even in the short term by the rapid rates of population growth found in some countries.

17. A major consideration in the adoption of population policies was the reduction of mortality, because of the universal value of human life, through health programmes. More recently, policies and programmes had been initiated to help parents to avoid unwanted children and to improve the health of children and mothers, thus contributing directly to human welfare by way of family planning. While those considerations were valid, it was important to add new dimensions to population policy, putting it within the wide socio-economic development context.

18. In many developing countries, there was inadequate allowance for population variables in the formulation of development plans and strategies. Allowance could take two forms: incorporating policies intended to influence population trends in the over-all development strategy; and shaping developmental strategy so as to accommodate population trends that were not readily subject to modification. Examples of policies intended to influence population trends were: efforts to reduce or divert very extensive flows of rural-urban migration; or a shift to an increasing range of activities to lower fertility. Population trends not readily subject to modification included changes in the next few years in the number of persons in certain significant age-categories, such as children in the primary-school age or persons at the age of entry into economic activity. It was important to recall in that context that in developing countries with a high proportion in young ages, substantial population growth was likely to continue for some time and that the time dimension for significant changes in population growth was wide in comparison with that of many economic and social factors.

19. In so far as the strategies and policies of developing countries towards higher standards of consumption and social well-being succeeded, they were expected, on the basis of the historical experience and observable current trends, to have certain effects on population variables. Mortality was certain to decline further. The continued spread of health programmes, changed motivations and attitudes, increasing industrial development, and a strong measure of modernization, including greater participation of women in many spheres outside the home, were bound to affect, in differing degrees, fertility and population trends. It was reasonable to assume that current population trends would not continue in the very long run. However, the timing of the expected decline in fertility might not be such as to secure the most favourable economic and social progress. It was thus likely that population policies would be designed and implemented to an increasing extent as part of development programmes.

20. This report is intended only to highlight those relationships between population and development which appeared most relevant to a clear understanding of basic issues for the formulation of policy options. These considerations—which are detailed in the three following chapters—were the foundation for the wider area of consensus referred to above.

I THE EFFECT OF SOCIAL AND ECONOMIC DEVELOPMENT ON POPULATION TRENDS

21. This discussion first examined what could be learned from the historical record of population trends. Patterns distilled from the record were briefly surveyed and conflicts over detail were considered later.

22. On the population side, the basic generalization of the emerging patterns was generally known as "the demographic transition". It was considered best to present at the outset an outline that is deliberately simplified and sharp. Shadings, subtleties and exceptions to the general pattern were introduced later Based on European experience, the highlighted features that emerged were

(a) An initial situation in the late eighteenth and early nineteenth century of relatively high birth rates and death rates, say, from 33 to 45 per 1,000;

(b) During the early process of European modernization, [illegible]

(c) A *significant consequence had been the increase in the* rate of population growth to a magnitude not experienced before. Towards the last third of the nineteenth century, birth rates between 35 and 40 per 1,000 and death rates between 25 and 30 per 1,000 implied rates of population growth of about 1 per cent. In comparison with the previously known sustained rates of growth, that rate had been unprecedented, although in contrast to the situation in contemporary developing countries, such rates were rather modest;

(d) In the course of time, however, a decline in fertility and in the rate of population growth had taken place. A new *ideal of the small family had arisen in urban areas*, under conditions of declining mortality, rising costs of child-rearing and declining contributions to family income from children. Family limitation had begun with the more privileged classes and had moved gradually to the less educated and lower income sectors of the population. Generally speaking, the decline in fertility was more rapid in areas in which mortality decline [illegible]

[illegible] mination of chemical and mechanical contraception.

23. Some qualifications to the broad picture just presented are called for First, there were significant differences in fertility in pre-modern society. In Western Europe, when industrialization had begun, there had already been a much lower birth rate than in the currently developing countries because of an unusual pattern of marriage, and because permanent spinster- [illegible]

observed and fertility had been controlled to some degree by various means Secondly, within the experience of the developed countries *could be found areas in which the fertility decline* had been parallel with rather than later than the decline of mortality and even a few instances in which it had occurred before the decline of mortality. Clearly, different socio-economic and cultural factors had been empirically relevant in different areas But in spite of varying circumstances, there was an over-all generalization that could hardly be denied. every population that had experienced the full impact of modernization—that is, wholly literate, mostly urban and highly industrialized—had much lower fertility and mortality than before it had been subjected to such social and economic development.

24 *Turning to the question of what specific features of* social and economic change affect population trends, it must be stated that there appeared to be better understanding of the general nature of the impact of economic development for population than discernment of the significance of population trends on economic growth. That was noteworthy since it was frequently believed that the consequences of population growth were easy to understand—by some it was even presumed to be obvious—whereas fertility was presumed to depend upon physiology and a complex set of socio-economic and cultural variables

25. The history of socio-economic development in the developed countries had been characterized by certain coherent and persistent features Among the important features were the stream of inventions and innovations which had revolutionized productive processes, the simultaneous increase in education, advances in medical knowledge and the gradual spread in the application of this knowledge; improvement in sanitation and public health measures; the increased capacity to store and transport food and other goods and increases in income per family All of those had led to an increase in average duration of life through a reduction of mortality rates in all ages, but *especially in infancy and childhood*

26 Before proceeding to consider the way in which some of those characteristics of modernization had also contributed to eventual fertility decline, mention should be made of the great difference, in terms of human welfare and the quality of life, between the two extreme alternative ways of achieving low population growth rates *(a)* the high mortality and high fertility pattern *versus* *(b)* the low mortality and low fertility pattern The overwhelming advantages of the low mortality-low fertility alternative, and the socio-economic conditions consistent with this pattern, were obvious. Once mortality rates had *declined and population growth accelerated, no one would* argue that a sensible way of returning to lower rates of population growth was through raising mortality Only lower fertility could reasonably be sought as an answer if rapid population growth was deemed to be undesirable

27 Modern economic growth, where it had occurred, had manifested itself through major shifts in the structure of production, which, in part, had stimulated or at the very least facilitated, the option and choice of gradually lower fertility rates Some of the correlates of modern economic growth were the introduction of technologically sophisticated types *of equipment and managerial arrangements*, great increase in the scale of the average enterprise, a persistent shift in the balance of production towards non-agricultural commodities, and a persistent shift in the locale of production and of population to urban areas. The increase and greater technological sophistication of production required types of administrative [illegible] erliness [illegible] Those [illegible] had signified also a shift in economic activities away from the family That had not only decreased the control of children by the family, and the dissipation of values favouring children [illegible]

addition, they contributed to increasing the costs of raising a family One could not go into all the details why that should be the case, but, in general, it was quite frequently argued that the increases in direct and indirect cost of children had led at the very least *to incentives for a lower desired family size*, regardless of whether the means of achieving such a family size existed.

28 There were numerous conflicts of opinion, some of which were brought out at the Symposium, about the exact details of the process responsible for fertility decline, and

different scholars would unquestionably emphasize different bundles of influences; but despite disagreements on details and language there was general agreement that the process of persistent modernization contained within it the seeds of the attenuation of the extended family, the change in location of the family and the shift in the pattern of social relationships within which the incentives were towards relatively small nuclear families. In fact, the very word family changed its meaning and significance as socio-economic development occurred.

29. While there was a general coherence to the situation described above, in which the nature and characteristics of modern economic growth appeared to influence eventual and sustained fertility decline, some qualifying remarks must be made. To begin, there were a few exceptions to the general picture. There were cases where the onset of fertility decline appeared to have preceded modernization. However, such examples in no way contradicted the proposition that modernization facilitated fertility decline. Secondly, modernization affected different groups in different ways. It usually influenced first those at higher socio-economic levels and then spread to other groups in society. It really was not known whether there was an international "demonstration effect" in fertility reduction as there was reputed to be with respect to many aspects of urban consumption patterns. Lastly, while it had frequently been emphasized that social and cultural aspects played a role in fertility decline; and, in some cases, it had been argued that that role was exceedingly significant, so far no one had attempted to measure those differences, and differing views on that subject, in the absence of quantification, appeared irreconcilable. Nevertheless, sustained, modern economic and social development as such was unquestionably a significant force.

30. The effect of late marriage on fertility, mentioned earlier in connexion with the experience of Western Europe at the beginning of the demographic transition, had been a significant factor in recent trends in many Asian populations. Increasing age at marriage had accounted for a major fraction of the decline of the birth rate in Japan from 1930 until the 1950s. It had been an important element in the recent pronounced declines in fertility in Hong Kong, the Republic of Korea, Singapore and Sri Lanka. In other developing areas, nuptiality has been a potentially powerful but generally neglected instrument for influencing population trends.

31. There was a question whether the historical experience of Europe, the United States of America and some parts of the British Commonwealth, all of which had developed prior to the Second World War, was of relevance to the currently developing countries. One could easily point to the differences in the two sets of situations. Mention has already been made of the very much higher rates of population growth that currently existed in the developing countries, and the fact that many countries with low income *per capita* had achieved low mortality rates. But despite those differences, the relevance of the lessons of the past remained. There was every reason to believe that the modernization of the currently developing countries would eventually lead to sustained fertility decline. The decline of fertility in Southern and Eastern Europe, in Western Europe, in sparsely settled Argentina and Australia, as well as in densely populated Belgium and the Netherlands; the similar population trends in developed socialist and non-socialist countries, the completion of the demographic transition in Japan and its initiation in Cuba and the Republic of Korea, and other countries in South-East Asia and the Caribbean, all confirmed the view that socio-economic development facilitated a reduction in fertility. However, it was not possible to specify a precise list of quantitative values of social and economic indexes identified with a beginning in decline of fertility. Three general conditions could be considered as having been essential for a major reduction in marital fertility: (*a*) the regulation of fertility after weighing advantages and disadvantages of additional births must be an accepted mode of behaviour; (*b*) lower fertility must be perceived by individual couples as advantageous to the parents and the children; and (*c*) there must be adequate knowledge and acceptance of effective means of reducing fertility, sufficient skill in the use of such means and ready availability of necessary supplies and services. Those conditions were found in every society at an advanced stage of socio-economic development. However, historical experience indicated that they had existed—when the only means available were folk methods—in less developed areas in Europe that had been at the time agrarian and low in literacy. The relevance of those conditions for the understanding of the trends in currently developing countries was as follows: (*a*) their universal prevalence in developed societies demonstrated the importance of social and economic development in facilitating the reduction of fertility; and (*b*) their occasional existence in populations that had not yet experienced social and economic development, suggested that population policies designed to reduce fertility need not be postponed to the later stages of development programmes and might in fact be reinforced by acceptance of recently developed, more effective means of fertility control associated with family planning services. In summary, historical as well as contemporary experience supported the widely held view that policies designed to influence population trends should be an integral part of general development strategy.

II. Population growth impact on economic development

A. *Natural resources*

32. In view of the fact that the Symposium on Population, Resources and Environment was to include references to the problem of natural resources, it was considered sufficient to go into the assessment of this issue only in so far as necessary to make the general argumentation complete and consistent. In discussing the relation between population growth and resources, a distinction must be made between that which represented fairly solid knowledge and that which represented a high degree of speculation. First, it must be noted, perhaps emphasized, that population growth *per se* had not been the only nor the major cause of the increased use of natural resources. In general, *per capita* income growth had been more responsible for the increased world-wide consumption of natural resources. Secondly, if one projected the need for resources to the turn of the century, or for the next 50 years, those projections would suggest that population growth *per se* would not lead to the exhaustion of resources. The historical experience of the United States of America, for instance, provided no evidence that domestic resource scarcities had developed and suggested that resources had grown as rapidly as industrialization and had become available at lower prices. That had been accomplished through discoveries of new resources or substitutes for natural resources, and through price changes operating as a stimulus to discoveries and as a rationing mechanism.

33. Shortages for certain resources did loom in the foreseeable future. There were grounds, however, to expect that properly guided scientific and technological progress, including the development of substitutes, coupled with long-run planning, should overcome the shortages.

34. A paper prepared by the United Nations Secretariat (E/CONF.60/BP.9) pointed out some of the details connected with the ideas presented above in a very general way. One should consider the large number of categories that were possible substitutes for any specific energy source—petroleum, natural gas, coal and lignite, oil shale, nuclear energy, solar energy, hydroelectric power, tidal energy, geothermal power. Almost all of those sources were being used to various degrees. Some sources of energy, such as nuclear energy and tidal energy, were in the early stages of development. Geothermal energy was an untapped resource where the question of reserves was hardly a consideration. Energy development was very capital-intensive and initial costs rather than population growth might be a severe inhibiting factor. On the question of reserves, it was important to keep in mind that large parts of the earth's surface had only been slightly, if at all, prospected.

Man had only begun to use the inevitable buildup of usable scrap supplies which were a consequence of industrialization. Off-shore production of resources and the utilization of the sea-bed were likely to be increased significantly.

35. Water resources constituted an [illegible] towards water-supply scarcity in relation to its demand was a subject of concern to a growing number of developing countries A need for larger food production by means of irrigated agriculture and other water uses in certain developing countries might lead to high rates of withdrawals which would put a strain on the reserves of water available. But even in the case of water it was important to mention that in many instances, man was not using water nearly as well as he knew how Recycling of water should add substantially to its availability. As water prices rose and desalination methods were further developed, it might pay to use desalination more effectively. In that connexion also, it was necessary to repeat the general principles that the question was not one of over-all availability, but availability at a given cost, which in turn was likely to depend in part upon the research and development of fairly well-known means of creating new sources of supply or of using more effectively existing supplies

36 Once one moved to longer periods of projections, considerable and almost irrepressible controversy arose as to whether population growth would lead to specific or general resource exhaustion [illegible] change, then at some point positive population growth would lead to resource exhaustion. On the other hand, if one believed that the mechanism in the future would work as in the past, then one predicted that as a resource became relatively scarce, the search for substitutes or new inventions and discoveries would overcome the scarcity The critical question was not the extreme one of amplitude *versus* exhaustion, but rather that of relative scarcity and its impact on resource price It was likely that the greatest consequence of socio-economic development and population growth in connexion with natural resources was not on the production of goods and services but on the pollution of the environment The substitutes for many natural resources involved by-products and wastes, which in turn involved the social costs of pollution Those costs and problems were not easily handled by modern societies Thus, it is not scarcity which was to be stressed under that heading, but the contribution of population growth to the undesirable by-products of the introduction of modern technology

37. The foregoing argument might have to be modified, if one considered the very long run, say, until the end of the twenty-first century and thereafter Man's power of anticipation was too weak for such a time horizon, however, and the conclusions therefrom were not imminent If there were convincing arguments for more rational population patterns in the developing countries, they should not be sought in the limitations of the world's natural resources. Rather, the argument of limited resources should be exploited for demanding appropriate patterns of consumption and production in the highly developed societies and in the developing countries as they achieved higher economic levels

B. *Population, food and agriculture*

38. It was generally agreed that, in the developing countries, the levels of calorie and protein intake were too low, and infant under-nutrition and malnutrition were widespread problems that had serious consequences for the future health and intellectual ability of the child. Solutions to those problems implied the need to raise the productivity of agriculture, enrich existing food-stuffs, conduct programmes to increase food consumption and improve nutritional levels through proper information, education and other means A considerable part of the world population lived in areas where the food supply was precarious. Those were often also the areas of rapid population growth Consequently, estimates of future food needs were derived from both the requirement that basic standards of food consumption be met and from the high rates of demographic change All that pointed to the necessity of conducting intensive programmes to increase food supply in the developing countries and of organizing adequate world food programmes through international co-operation In some countries, the prospects for food supply might appear better than in others, but in the developing countries as a whole the experience so far indicated that, even with the introduction of new agricultural inputs and techniques in some areas, it had not been possible to increase agricultural output by as much as 3 per cent per annum Although the rate achieved probably exceeded that of population growth, it allowed for a margin too small to raise significantly and permanently the average levels of nutrition

39 In many countries where the prospects for increased agricultural output were limited, the advantage of a lower population growth rate in bringing sorely needed gains in nutrition was evident

40. Furthermore, the prospects for agricultural [illegible] organizational difficulties, and the cost of extending the area of land under cultivation could not be minimized Moreover, population density in Asia was much higher than in Africa or Latin America The main hope lay in the use of improved seed varieties, more intensive use of industrial inputs and increasing agricultural skills, in order to raise yields per acre Multiple cropping, wherever that was possible, should also help So far, actual results had, on the whole, fallen short of expectations, and th net income to the agricultural population had, in the face of rising costs, not been increased very much In general, the economic, social and agrarian structures had not favoured substantial improvements in the level of living and nutritional levels of the rural populations

41. A significant question which arose was whether there were enough new types of production techniques in agriculture which were known and which could be borrowed by developing countries in order to continue to increase productivity per acre as population grew In other words, different countries were at different points in what might be called their "technological option frontier" Some areas, or parts of countries, might have exhausted most of the possibilities for technological improvement, and if such countries had rapid population growth in agriculture then they, indeed, faced serious difficulties in maintaining output per man, but many other areas might be in a situation where they could quite readily find new possible improvements available so that through the adoption of such innovations productivity per man could continue to rise.

42. In any event, the high birth rates prevailing generally in the agricultural sector of the developing countries, combined with the substantial proportion of population living on the land, signified that food availabilities had to be shared, according to an increasingly difficult choice of policies for equitable distribution, particularly when rapid urbanization took place between rural and urban sectors In many areas, surplus farm population existed and serious agricultural employment problems had arisen. In most areas, migration to urban settlements had alleviated the pressure on the land, but had added, in the absence of sufficiently rapid industrialization, to the burden of employment and of providing food supplies and services in the cities The impact of rapid population growth on agricultural productivity, food supply, employment and migration consti-

tuted a complex interrelationship, which varied according to different national and local conditions. Most technical solutions, in spite of the need for labour-intensive methods of production, tended, on the contrary, to be in the direction of lower labour-input requirements. That should be carefully taken into account in assessing the significance of current population trends.

43. In a balanced over-all approach to agricultural development in relation to population growth, the prospects of the international market for the agricultural produce of the developing countries should also be considered. The highly protective policies of the developed countries were frequently an obstacle to the encouragement of agricultural output in the developing countries, particularly through their effect on export prices and consequently on balance of payments prospects. The combination of inelastic supply of food and the restricted market outlook obliged many developing countries to devote large shares of their normal export proceeds to meeting food imports. Such countries, under exceptional conditions, as in the case of current famine conditions in parts of Africa and India, also had to resort to international food aid programmes. That was not a lasting solution to the pressing problems posed by the population growth and nutritional needs of the poorer nations. In the long run, international technical and financial resources would be required in much larger volumes to help the developing countries achieve a large measure of self-sufficiency in basic foods, which would also be facilitated by a lower rate of population growth.

C. *Population and health*

44. Health interacted with population and development and tended to be an intervening variable in the interrelations between the two. Health directly affected levels of mortality and population growth, was directly and indirectly related to fertility and had considerable influence on migration, productivity and attitudes to work and social welfare. Population growth, in its turn, created an increased demand for health services and a rapid increase in numbers produced a strain on delivery systems and the development effort.

45. Better health had multiple effects on population trends. The provision and growth of health services would reduce mortality—and morbidity—and thus contribute directly to population growth. Although there was controversy about whether past reductions in mortality had been caused primarily by health services or by improvements in general economic and social conditions, there was little doubt that both were involved and that medical and public health advances would continue to further declines in mortality. It had also been noted that better health might cause a slight increase in fertility in the absence of family planning.

46. Abundant evidence had been accumulated showing that high parity directly affected the health of children. The risks of stillbirth, infant mortality and child mortality were high with first births; they declined and then increased with parity after the fourth birth. Similarly, short birth intervals were found to have a deleterious effect on child health. For national development, the effect of parity and spacing on child health and growth might be an even more important consideration than mortality. The height and weight of children was inversely associated with family size. Various intelligence tests showed that scores decreased with increases in family size, and that effect had been shown to persist with social class. More specifically, malnutrition had been shown to be more common in large families and money spent per week on food decreased with increase in family size. Careful longitudinal studies had shown increasing incidence of common respiratory infections and gastro-enteritis with larger family size, presumably because of greater exposure. There was a clear association between the quality of maternal care and family size. The health of mothers was similarly affected. Parity directly affected maternal mortality, with a steady and sharp increase in risk after the third birth. All those manifestations were, of course, linked with multiple causal relationships, and unobserved mediating v ables might be more important than those observed. In par ular, social and economic conditions would appear to be am the major underlying causes.

47. In recent years, increasing attention had been given the proposition that the experience and/or expectation of h infant and child mortality might hinder significant movem towards lower fertility in much of the developing world. S stantial reductions in child mortality might be an importa although perhaps not essential means of encouraging a decre in fertility in areas where both fertility and mortality w high. Efforts directed specifically towards the reduction of cl loss and especially towards increasing perception of grea child survival, although not guaranteeing fertility decline, mi shorten the demographically important lag between the decl of mortality and fertility rates. That did not mean that mor ity decline would "lead to" or "cause" fertility decline. W might be true was that lower mortality either facilitated was a necessary condition for the introduction of the incenti for lower fertility. Several studies had consistently demonstra higher fertility in association with the experience or fear child mortality, an association which was explained neither socio-economic differentials nor in terms of the greater ri generally noted for higher parity children. All studies w quite clear that among couples experiencing child loss, attitu towards contraception were less favourable, current usage v depressed and the timing of first use was delayed in comparis to couples without such loss. It would be from a prospect evaluation of the magnitude of those effects and their con quences for fertility reduction that the case for investment an attack upon infant and child mortality would be m persuasive. Prospective field studies to quantify those effe for population at different levels of mortality and fertility, a in different geo-cultural regions, could make a significant co tribution to the understanding of them.

48. Whereas better health had usually been considered major cause of population growth, the point needed to made that it could also contribute to a more rapid fall birth rates by increasing the practice of family planning. Th were obvious organizational and political benefits to be obtain by combining health, nutrition and family planning servic Integrated services allowed more efficient use of availal supplies, equipment, transportation facilities, personnel a organizational structure. Integrated services made more ser to those using health services. Thus, family planning servic might have minimal impact because they did not provide ad quate follow-up care to acceptors and that could be mo readily done in conjunction with other health and nutriti services. Political acceptability was increased by relating acti ities for which public demand was equivocal to care pr grammes that were spontaneously and continuously in deman In some places, complications resulting from induced abortio might also lead to recognition of the need for family plannin

49. Rapid population growth in low *per capita* income cou tries required the expansion of low-cost services. The hi cost, one-to-one doctor-to-patient relationship, plus the provisi of ample modern hospitals or clinics of the type found major urban centres could not do the job and could not financed. But experiments were under way which provid integrated family planning and health services through regio alized delivery systems using auxiliary personnel and simplifi techniques at very low costs *per capita*. Where basic heal delivery systems existed, family planning could be incorporat at very little extra cost. Even where all services were lackin the obvious advantages from better health and improved nut tion could be introduced at little cost to the economy becau of the improvement in the quality of labour and raised labo productivity. Health and nutrition were themselves major obje tives of development, since they contributed directly to a bett quality of life. Their synergism, when integrated with fami planning services, then represented a practical and constructi priority emphasis in social development.

D. Population, education and employment

50 In the developing countries, with annual rates of population growth of around 2.5 per cent and high fertility, the vast majority of the population was in the younger age groups. The growth of the potential school-age population might be as high as or higher than 4 per cent per annum. If one considered simultaneously the desire in such countries to shift towards universal education, at least at the primary-school level (frequently as a shift away from low current attendance levels, sometimes as little as 30 per cent), then one could visualize fairly high rates of expansion in the demand for [illegible]

51. Special attention given to the demographic aspects of education was reflected in the educational plans formulated for the developing regions. The educational burden on developing countries weighed heavier not only because the proportion of the school-age population was higher, but because the working population which had to bear that burden would be relatively smaller. A young age structure with prevailing pupil-teacher ratios and enrolment also implied the need for a larger number of teachers per thousand population Since rapid population growth was associated with a young age-distribution, providing for the education of the school-age [illegible]

enrolment ratios

52 One of the issues in the growth of urban populations was the set of complex relations that had evolved between population growth, education and employment opportunities Rapid growth in the number of children of school-going age, together with pressure for the early attainment of universal primary education and higher enrolment ratios in secondary schools had tended to lower the quality of education. On the other hand, as the result of increased schooling, even if defective, the rural educated considered themselves over-trained for farm labour, and the lure of the cities and the possibility of [illegible] migrants to urban [illegible] frequently could [illegible] ts and new urban [illegible] propriate to their levels of education—although such jobs might have been available to them when the supply of graduates had been much smaller. The net result was urban unemployment, frustration because some graduates must take jobs at a lower level than they deemed appropriate, and a waste of resources, since some of the training was never utilized Moreover, lower quality in education frequently meant that actual skills and productivity levels would be below that which the certificate implied, even for those who did obtain employment appropriate to their presumed certification level.

53. Even in the absence of population growth, the existence of considerable wage differentials between the agricultural and [illegible] more attrac- [illegible] degrees of productiveness of urban *versus* rural life Nevertheless, population growth contributed to the problem in two ways. On the one hand, it might contribute by lowering the real consumption standard per person in the agricultural sec On the other, it contributed by providing a greater num of people to migrate to the urban sector. If sufficient jobs w not created in the urban sectors, such migration led to enlarged pool of urban unemployed or partially employed.

54. Furthermore, a point that must not be overlooked that even if population growth was a link in the chain causation, it was usually not the only cause The demand almost universal education was the significant link. Very population growth would not entirely eliminate the probl but certainly would reduce it Furthermore, inadequate some of the education might be, it might be considera better than none Also, partial employment in the city mi still lead to a higher product than a fuller degree of empl ment in the countryside

55 Looking at the impact of education on population must be emphasized that a great many correlations sugge: the reasonable hypothesis that education, especially the e cation and employment of women, usually in combination w other influences, was one of the elements that facilitated was responsible for the eventual sustained fertility decline t took place in the course of socio-economic development.

E *Population and social inequality*

56 The most difficult problem to discuss was the relat between population growth patterns and social justice, in wh income distribution stood as a crucial issue In part, that because there was really little understanding about the relati ship between economic development and income distributi To the extent that a generalization could be made, it believed that more often than not, the early stage of dev opment was characterized by a great inequality of income opportunity Under the prevailing patterns in many countr the development process tended to aggravate that inequa still further. It would be misleading to state that that tende was mainly due to the population growth patterns, althou they did play a certain role It was emphasized, however, t that should not lead to a neglect of the other factors, wh were by far more important, but to place the population iss within a wider framework of socio-economic developm policies supportive to the attainment of greater social justic

57 As previously observed, rapid rates of population grov put a heavy burden on educational capacities and might ham the improvement of educational quality The same was tr *mutatis mutandis*, for health services. Those phenomena co not be viewed, however, except in over-all, aggregated ter They had a clear impact on equality of opportunity and the distribution of income They affected particularly advers the poorest population strata Historical experience had dem strated that fertility decline took place first in higher inco groups Such groups were then able to "invest" in their ch dren's education, skills, and provide other types of oppor nities. Through being the earliest to adopt a small fam system, they achieved an advantage for their children as co pared with lower socio-economic groups. To the extent tl Governments provided relatively equal opportunities for e cation to all groups, that might counteract to some degree influence of differential fertility rates By and large, howev high fertility rates prevailing among the poorest sections of population presented a formidable obstacle to overcoming existing great inequality of opportunity.

58 Population growth also contributed to the probl through its effects on the relative distribution of labour the two main sectors of the economy; internal migration a particularly, the degree of employment. The problem of inco distribution was, to a great extent, a question of producti employment. It was from that point of view that a rou picture of the impact of rapid population growth on empl ment and income distribution could be obtained.

59. An illustration was provided by the comparison of developed country (from Western Europe) with a develop country (in Africa). The latter had

growth of 3.3 per cent per annum compared with 0.4 per cent in the developed country. Hence, the developing country must create—per thousand population—eight times as many additional employment opportunities as the developed country. However, it was estimated that the resources of the developing countries for this purpose were only one fifteenth of the total resources per thousand population in the developed country. Thus, the available resources per job to be created in the developing country were only one one-hundred-twentieth of those available to the more developed country. If the developing country attempted to provide additional employment opportunities identical to those offered in the developed country, it could provide less than 1 per cent of the total number of additional employment opportunities needed.

60. Strong arguments had indicated that there was a significant age distribution impact on income distribution. Unemployment and relatively low incomes were more common amongst the young. Hence, countries with high fertility rates, where the proportion of young people in the population was higher, were also likely to have a more unfavourable income distribution. In addition, young populations had a high dependency ratio, that is, a smaller proportion of the population was within the working age groups; and, as a consequence, a higher ratio of family members were dependent upon those who worked. That obviously contributed to a lower level of consumption per family member. Thus, reduction in fertility, the consequent change in the age distribution, and a narrowing of the degree of differential fertility between socio-economic groups contributed to achieving a more even international income distribution. The same was true within countries where high fertility and higher dependency ratios might be found among the lower income strata.

61. The foregoing reasoning did not imply that a mere decline in the fertility of the poorest population strata would lead to a greater equality of opportunity. There existed a strong feedback interrelation between poverty and high fertility rates. Although that feedback had reinforced social inequalities in the past in many countries, the reverse of this mechanism might and should be used to achieve greater social justice. That open alternative should be clearly perceived.

III. Population and socio-economic development

62. An interesting and, in the opinion of some, an important type of work undertaken in recent years had involved attempts to create models of the economy that reflected both important aspects of the process of socio-economic development and the impact of population growth on various sectors of the economy. Some obvious influences and sectors were the growth of the labour force, the effect of productivity on agriculture, the degree of migration from rural to urban areas, the demand for jobs in various categories, the demand for education, health and other welfare services, and the need to supply additional labour with the requisite additional equipment so that productivity per man was maintained or increased. For the most part, that work was in an experimental stage. There were grave problems involved in determining the appropriate form of the formalized system, the exact equations to use in order to reflect the behaviour of human economic agents—and in finding the necessary data to feed into the formalized system. It was hoped that work of that kind would lead to a more sophisticated understanding of the complexity of the interactions between economic and demographic variables. It was also hoped that formal models of that kind would clarify the exact meaning of certain concepts which were currently used rather vaguely, that they would increase the precision in the use of ideas and expression of relationships, and that they would suggest explicitly the data that would be useful for countries to collect, and so on. Clearly, should such models prove to be successful and lead to reasonably accurate predictions, that would help considerably in the work of calculating the cost and benefits of alternative population policies. There, when one used the word "policies", one meant not only specific family planning programmes, but those policies which influenced social and economic variables or conditions, which in turn influenced the incentives of households in determining the desired family size.

63. Even if such models could not make successful predictions, they might help in the assessment (if they were well formulated and if adequate and proper data were available) of the consequences of alternative rates of population growth in specific development contexts. It was frequently of great interest to try to determine how sensitive a given development plan and its results were to different prospects of population growth. Also, models of that type, if they were reasonably reliable, would make it possible to determine the consequences if current population trends were to continue well into the future. As stated before, it was impossible to envision that current trends would continue indefinitely. However, it would be of interest to know what the consequences would be. There probably was enough knowledge currently available to assess the direction of future prospects and to encourage socio-economic development, inclusive of appropriate population policies and measures, in order to avoid unfavourable consequences of current demographic trends; but reliable models might make it possible to fashion policies that would move somewhat closer to optimal results, and suggest something about the urgency of such policies.

64. There was one very significant logical obstacle to building population impact models for reliable predictions. It was not possible to have a clear-cut line of causation between population growth at one end and consequences at the other end. The reason for that was that the consequences must depend upon what else was occurring in the economy simultaneously. For example, consequences of population growth with a 5 per cent rate of investment would be very different than with a 25 per cent rate of investment. Likewise, the consequences would be very different if innovations in agriculture shifted agricultural practices from a single crop per year to a double crop per year, as against those cases where no such innovations were undertaken or attempted. Also, the consequences were likely to be different if a great deal was spent on education and on-the-job training, which in turn affected the quality of labour, as against the cases in which very little was spent on education, or where education was ineffective. It was easy to think of many other examples. The main point was that such models must have limited applicability, since it was difficult to conceive that they could predict enough about the other inputs into the economy necessary to obtain accurate information on the significance of the rate of population change. Nevertheless, such models might be extremely important in suggesting the different consequences of population change under alternative exogenous input-time patterns. Only the future could tell how useful such models would turn out to be.

65. In the past decade and a half, considerable work had been done in attempting to formalize the theory of fertility, that is, to create formal models along the lines of economic theory or socio-economic theories. That work had assumed that, to some degree, economic conditions created pressures on families to calculate whether or not it was desirable for them to have additional children. For the theory to make sense, it was not important to assume that everyone made such calculations, but only that a sufficient number of households did so. Those theories presumed that what really mattered was the motivation for family size limitation, and that family planning techniques were, for the most part, facilitating devices. In general, those theories emphasized the benefits and costs that a representative couple would take into account (and the psychic evaluation of the benefits and costs) in order to determine the number of children they desired.

66. There was considerable controversy as to which of the variety of specific models of this type happened to be correct. In general, considerable emphasis was put on the costs of children. That involved the costs of nurture, education, the

income forgone by the mother because she was prevented from working in order to care for children, or by the child who *sacrificed income from work when he went to school.* In addition, the psychological cost of family planning was frequently not taken into account. Space limitations prevented discussion of any of those specific theories. The econometric work that had been employed to test *some of these models* showed that only a small amount of the variance in fertility rates either between occupational groups, other groups, or countries, or over time, could be explained by such models.

67 Should a fairly successful socio-economic model of fertility determination be worked out eventually, then it would be likely to be of value for policy purposes Such a theory, if applied carefully to real countries, should enable policy-makers to determine what aspects of the changes that were taking place in the economy, and what socio-economic changes that were controlled by government, such as the tax system or the availability of housing, contributed to the change in fertility and to what extent they did so. It might turn out that some changes in policy might reduce fertility more rapidly or that some policies directed to reducing fertility in fact increased fertility. Some would argue that that was an area well worth promoting, but others would suggest that other research areas *were more productive. The need existed to investigate* much more carefully than was done at the Symposium where the most fruitful research frontiers were likely to be Nevertheless, despite the controversy, if work in that area turned out to be *successful, it would help Governments to a considerable extent* to fashion policies, if they wished to do so, and to implement such policies, in order to come closer to reaching their objectives

68 *Some recent attempts had been made to build models* describing the interactions between population variables and

to trace the influence of a given exogeneous factor through the entire course of relationships which formed vital links in the chain of economic and social processes.

IV. Conclusions and implications

69. The problem of population and development had become one of world-wide concern. Population in developing countries was *increasing at unprecedented* rates By almost any measure, the great disparities in levels of living between more developed and developing countries were widening. The increasing concern with population trends and their impact on socio-economic development patterns reflected in the convening of the World Population Conference, 1974, and the formulation of the World Population Plan of Action, was fully justified.

70 It needed to be emphasized that the problems posed by development and population were not separate issues. The

the formulation of appropriate measures and strategies to improve levels of living

were appropriate, were likely to bring about a decrease in fertility That again facilitated economic and social improvement.

72. Voluntary, informed decisions about the number and spacing of children were basic rights of each couple and are a constituent part of social welfare.

73 Population policies, however designed, could not by themselves solve the major problems of the world and a preoccupation with population should not divert attention from critical issues in the world development process. However, in conjunction with other policies, they could greatly facilitate the solution of those problems and contribute to a more rational development of humanity over a longer time horizon.

74 Population growth was not always an obstacle to development, and lower population growth did not automatically bring about faster development Nevertheless, many countries found that lower population growth, and the characteristics associated with it, would facilitate the solution of their basic social and economic problems In addition, there was, in the Symposium, a general consensus that very high rates of population growth were usually an obstacle to development.

75 Since high birth rates were usually prevalent primarily among the less privileged sectors of population which maintained the traditional modes of production and social organization, development policies—including population policies—should emphasize fostering socio-economic change in those *sectors Elements of such policies included a balance between* agriculture and industry in development planning, sufficient employment opportunities, a more equitable distribution of income and special concentration on the provision of education and of employment opportunities for women outside the home. Such measures would help to fulfil the basic development objective of social justice and contribute to favourable changes in patterns of demographic behaviour.

76 In considering the relation of population to development, one must distinguish the different positions and diversity of circumstances that existed In most developed countries, fertility was low and mortality from infectious disease had been reduced to very low levels While there were in those countries social problems associated with population trends and

structure, increasing numbers and *proportions at old ages* and inadequate access among the relatively impoverished segments of the population to the information and means needed for

77. The precise nature of the interrelations between population and economic and social variables in the developing countries differed among regions and individual countries. One must distinguish between countries rich and poor in resources, between large and small countries, between densely settled and sparsely settled, those which had high and even growing population growth rates and those where rates had begun to fall, differences in degree of urban *concentration, cases in which* agricultural output was easily expanded as against those in which it was difficult to do so, and so on. It should be noted that in different cultures, traditions may differ (that is, with *respect to the role of women or to the importance of having* sons) in such a way as to alter the links between the policies that might be deemed to be desirable and the action and programmes that were feasible

78 *Rapid population growth in developing countries with* predominantly young age structures was likely to persist for some time Resources for socio-economic development were limited Hence, rapid population growth could put a strain on

the possible budgetary allocations made available for social goods and services, such as health services, education, maternal care, the education and training of women and the provision of social security. Reducing population growth was likely to lessen the constraints on the provision of those elements of social progress.

79. Socio-economic development was a powerful force in improving the qualitative characteristics of human beings, both physiological and intellectual, which conversely made a significant contribution to socio-economic development. Improved health conditions might tend to have the net effect of increasing population growth in the short run. However, the expansion of health services in the widest sense, including the use of auxiliary personnel, would contribute to lowering fertility, directly when effectively integrated through promoting family planning utilization, and indirectly through the changing attitudes towards fertility resulting from declines in infant mortality.

80. The reduction of morbidity and mortality was a high priority in any type of society and met both individual and social needs. It was thus an essential goal of development, aside from its indirect contribution to economic progress.

81. High rates of internal migration and urbanization were characteristic of many developing countries and were also related to high rates of over-all population growth. In spite of the tendency for long-term urban residents to have lower fertility, newly arrived migrants in the cities tended to maintain their rural fertility patterns for some time. Such migration was again partially the result of restricted employment opportunities in certain low-productivity agricultural areas, in which the flow away from low-productivity agricultural areas was aggravated by high fertility. Population policy should include efforts to influence the flow of internal migration in order to produce a more balanced future distribution of population. In any event, rapid urbanization would require an appropriate allocation of resources to provide urban infrastructure and low-cost housing.

82. Population growth, age structure and rural-urban migration were important factors making for increased educational demand in developing countries, while the goal of universal primary education and higher rates of enrolment at other levels also contributed significantly to the prevailing pressures on the educational system.

83. The integration of women in the development process through the provision of their widespread inclusion in the educational, social, political, and economic opportunities was likely to create the conditions that would foster the reduction of the birth-rate. That, in turn, would improve the status of women and their ability to participate in social and economic life. Adequate employment opportunities for women should therefore be provided.

84. Lack of access to education, insufficient nutrition and poor health tended to perpetuate inequalities in opportunity and in income distribution. That, in turn, prevented fertility from declining. Social and economic policies should, therefore, as a matter of high priority, pursue programmes to improve income distribution and social justice. At the same time, programmes to reduce fertility in the least privileged strata of the population would work in the same direction.

85. It was necessary to increase knowledge of the interrelationships, evolve better analytical methods, improve data collection and overcome the acute shortage of qualified personnel in socio-economic and demographic research. Greater international co-operation was needed in that area.

86. Population policy should in every case be an integral part of development planning and policies. Development programmes that encouraged faster economic growth and appropriate social patterns were essential to facilitating solutions to population problems. By the same token, international policy measures directed to more rapid progress of the developing countries by way of trade, aid and transfer of technology would also contribute to the same end. The world community should be made fully aware of those considerations.

Appendix

AGENDA

1. Election of officers
2. Adoption of the agenda
3. Population and development in perspective
   - (a) Population and development in historical perspective
   - (b) Prospects for demographic change and economic and social development
4. Economic and social implications of alternative demographic prospects
   - (a) Population trends and economic growth and structure
     - (i) The growth of income and its determinants
     - (ii) Industrialization and agricultural development
     - (iii) Urbanization and the geographical distribution of population
   - (b) Population trends and the demand for goods and services
   - (c) Population trends and the distribution of income, and economic welfare
5. The implications of prospective trends of economic and social development for demographic change
6. Population and development in regions and selected countries
   - (a) Regional population and development trends
   - (b) Demographic aspects of economic and social development in selected countries
7. The quest for optimal patterns of demographic, economic and social development

Annex II

REPORT OF THE SYMPOSIUM ON POPULATION, RESOURCES AND ENVIRONMENT

Introduction

1. The Symposium on Population, Resources and Environment was held at Stockholm from 26 September to 5 October 1973 It was one of a series of symposia held in preparation for the World Population Conference, 1974, as *recommended* by the Population Commission at its sixteenth session [1] and endorsed by the Economic and Social Council in its resolution 1672 (LII).

2 The 1974 Conference, as endorsed by the Economic and Social Council in its resolution 1484 (XLVIII), is being organized as a meeting for Government representatives It will differ from the World Population Conference, 1954, held at Rome, and the World Population Conference, 1965, held at Belgrade, which were technical meetings Therefore, a series of scientific activities was planned in preparation for the World Population Conference, 1974, to identify and clarify critical problem areas at the technical level.

3 Among those pre-Conference activities were four symposia on population and development; population and the family; population, resources and environment, and population and human rights. Those were technical meetings of experts participating in their personal capacity.

4 The Symposium was organized by the United Nations in [illegible]

plines with particular concern on some aspects of population participated in the Symposium A number of technical papers were specifically commissioned for the Symposium; other papers were submitted by various agencies and organizations of the United Nations system.

5. The Symposium was opened by Alva Myrdal, a Cabinet Minister, who welcomed the participants on behalf of the Government of Sweden Mrs Myrdal referred briefly to her country's experience as the host of the United Nations Conference on the Human Environment, 1972, which had been able to achieve a remarkable success in the negotiations of new and controversial issues among countries. She admitted, however, that population questions were more complex in nature than the environmental issues The Secretary-General of the World Population Conference expressed the appreciation of the United Nations to the Government of Sweden for its invitation to convene the symposium at Stockholm He observed, among other things, that the United Nations Conference on the Human Environment had recommended that the World Population Conference, 1974, should devote special attention to the questions of population in so far as they related to the environment of human settlements He reminded the experts that the Symposium was in a particular position to formulate scientific views on those and other pertinent issues before the Conference. He particularly emphasized the recent changes in the pattern of human settlement and urbanization as well as their profound implications on social and physical environments.

[1] See *Official Records of the Economic and Social Council, Fifty-second Session, Supplement No. 3,* para. 166

6 The Director of the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, in outlining the particular issues relevant for the elaboration of the Symposium, drew the attention of the participants to the danger inherent in indulging in emotional speculation, exaggeration and dogmatism during the deliberations He warned the participants of apocalyptic statements although he admitted that, as in all cases, the fundamental difficulty in an empirical approach to the solution of the problems of population, resources, environment and development in their complex interrelations lay in ascribing to each factor the appropriate weight it deserved The Deputy Executive Director of the United Nations Environment Programme recalled, among other things, that at Stockholm in June 1972, the world, for the first time, had acknowledged that something had gone wrong with the way in which man had been managing his environment He stressed that good management of the earth's resources was a key and that if the countries of the world managed the planet carefully, it would be possible to optimize food production by controlling pollution, reclaiming damaged land and developing modern agriculture He expressed a belief that in a well-managed world, the upper limit to the number of people that the earth can support comfortably might be raised significantly

7 L Tabah served as Director of the Symposium, G Adler-[illegible]

the Technical Secretary Owing to the nature and scope of the Symposium, there were several chairmen, varying according to the topic of the agenda as described below A Herrera chaired the meetings related to agenda item "Population and natural resources", R Revelle, "Population and environment"; S. H Ominde, "Population and settlement", H Uzawa, "Impact of technological innovation and transfer on population", J. Fisher, "Critical review of population-resources-environment models"; A Bose, "Interactions of population, resources and environment", and P Hauser chaired the final sessions for the adoption of the Symposium report R Ridker acted as the Rapporteur of the Symposium

I Basic themes and conclusions

8. The objective of the Symposium was to review recent scientific knowledge concerning the interrelationships of population, natural resources and environment in order to provide background for the Government representatives to the forthcoming World Population Conference to help them in their deliberations about the role that population policy can play to improve future events Underlying this interest was a series of questions posed to the participants on its opening day. Why was there growing concern with population growth? Were recent warnings that the world was in danger of running out of resources correct? Was man seriously disrupting the environmental systems upon which all life depended? To what extent could technology overcome those problems? What were the implications of the highly unequal distribution of population in relation to resources and incomes in the world? How were the changes in human settlement patterns likely to affect the

situation? Were such changes, along with other socio-economic changes, likely to ameliorate environmental problems directly (by reducing destructive uses of its environment) or indirectly (by affecting demographic variables themselves)?

9. The discussion of those and related issues ranged far and wide. In part, that occurred because of the interconnectedness of the variables of main interest: a change in population size, distribution or growth rate within specific areas not only affected resource and environmental variables, but those variables could have significant effects on population parameters as well. It also occurred because population was only one of the many factors —and not always the most important one— causing resource and environmental problems. The composition, rate of growth and geographic distribution of economic activities, the technology utilized, and a host of socio-economic, institutional and political factors were all extremely important in determining the character of the relationships between the three central variables of the Symposium.

10. Lastly, the diversity of the discussion reflected the problems that the members of the Symposium had in trying to answer those difficult questions. Such concepts as resource exhaustion, environmental deterioration and limits to growth were not very precise. The questions posed could not be answered in the abstract. Ultimately, the answers must be based on empirical evidence for specific countries, specific resources and specific environmental threats. But for most of the issues at hand there was not much empirical data that could be used for scientific analysis of future opportunities and constraints, or to understand historical processes.

11. In a situation such as that, where the evidence was poor, the questions broad and general, and the participants from a variety of countries, professional fields and political backgrounds, it was, perhaps, inevitable that there should be significant differences of opinion. While those differences can be fully appreciated only by studying the individual papers presented at the meeting, a brief, initial characterization is useful in order to put into perspective the broader conclusions that were finally reached.

12. To a large extent, those differences centred around attitudes concerning two different kinds of limits or barriers to human development and progress. First, there were what might be called ultimate, or natural, limits to material growth. Those had to do with the fact that growth within a finite space could not continue for ever. Scientific and technological advance could postpone the time and moderate the way those limits were reached, but it could not repeal fundamental laws of nature. Ultimately, therefore, all countries must choose how they wanted population and material economic growth to cease, through the operation of natural forces, or in a manner and at a time chosen by man. Secondly, there were proximate, or man-made, barriers to growth and human development. Those were the institutional, political and international conditions that restricted the ability of individual countries and some groups within countries to take full advantage of the available resource base. The unequal distribution of income and power in the world, both between and within countries, bore stark testimony to the presence and seriousness of those barriers.

13. There was little disagreement about these proximate barriers. All participants emphasized their importance in creating and perpetuating poverty in many areas of the world, the need to give top priority to efforts to eliminate them, and the difficulties that rapid population growth created for such efforts. Differences about the means that should be used to correct the situation and about the importance of population growth in relation to other casual factors were, of course, present; but many of those could be related to differences in the socio-economic situations of various countries. One of the important themes to emerge from the Symposium was the diversity of circumstances to be found around the globe.

14. There was more disagreement about the ultimate limits. If the world, or major portions of it, were approaching such limits within, perhaps, the subsequent 100 years, it was considered imperative that population and material economic growth be stopped, or at least significantly slowed, in the near future. Given the enormous momentum involved in demographic and socio-economic processes, there was no time to lose. But if humanity was still several centuries away from the ultimate limits, the policy implications would be much different. In that case, there would still be reason for concern about the speed with which population, resource consumption and environmental disruption increased, since high rates of change in those variables could throw up problems faster than solutions could be found, force mankind to live with greater uncertainty and risk, and make the elimination of the proximate barriers more difficult. But if it was not imperative to limit growth in the immediate future, according to that view, other considerations could and should play an important role in decisions.

15. The problem was ignorance of the factors determining such ultimate limits. The mineral and energy reserves ultimately available to man were unknown. Unknown also were how much new land could be made suited for agriculture, the extent to which additional fresh water-supplies could be developed, the seriousness of the disruptions to ecosystems caused by man's efforts to acquire those resources or the timing of technological advances required to extend current limits. Nor was much known about behavioural responses likely to result from growing resource and environmental pressures. It was agreed, however, that far more serious efforts must be devoted to overcoming those areas of ignorance and that until they were overcome, mankind must search for some strategy that took appropriate account of the uncertainties and risks involved. In most cases such a strategy must involve serious attempts to contain the growth in demand as well as efforts to break supply constraints; one without the other was unlikely to be sufficient.

16. A second important issue to emerge at the Symposium pertained to the relative importance of different factors in creating or aggravating resource and environmental pressures. It was generally agreed that three broad sets of factors were involved: population; *per capita* output; and a set of qualitative factors, such as institutions, policy and technology, that determined the material content of total output, its allocation and the way it was used.

17. Those who stressed the importance of reducing population growth argued that there were few if any additional advantages to be obtained from further population growth at the current stage in human history. No matter where a country was with respect to the ultimate limits to growth, a higher population growth rate meant more rapid depletion of domestic and international resources, greater pressures on the environment, more dependence upon continued rapid technological developments to solve the problems, less time to overcome the social, institutional and political barriers to progress, fewer social options and a continued postponement of the resolution of the problems caused by past growth. In contrast, a lower population growth rate bought time, resources and additional options: time to find solutions; resources to implement solutions; and additional freedom of choice in deciding among various patterns of living.

18. The participants holding that view recognized that a slow-down in economic growth might provide similar advantages in the developed countries. Indeed, one study cited in the Symposium indicated that a reduction in economic growth for developed countries would be likely to reduce resource consumption and environmental pressures by more than would a further slow-down in population growth. But, they argued, growth in the economy could be utilized for other ends. While it added to problems that needed solution, it also added to the capacity to solve problems. It was difficult to find similar offsetting advantages from rapid population growth.

19. No one suggested that economic growth in the poor countries should be stopped, but several participants did argue in favour of a slow-down in material economic growth in what some called the "overdeveloped countries". Reference was made to the disproportionate share of the earth's resources consumed

by those countries and it was claimed that their consumption patterns were wasteful and environmentally detrimental. In essence, the argument was that *per capita* income was already so high in those countries that the advantages, domestically and internationally, of additional increases in output were no longer greater than the disadvantages

[illegible]

material flows within and between countries.

21. In the end, a number of participants came to feel that [illegible]

different countries found themselves with respect to population concentration and growth rates, the size of the resource base, and the relationship between economic growth, unemployment, and income inequalities, that few generally valid recommen- [illegible]

own population

22 With this background of different perspectives presented at the Symposium, the areas of common agreement can now be discussed These areas are listed below, much as the participants drafted them on the final day of the Symposium

(*a*) The Symposium examined problems of population, resources, environment and development in many of their manifold and complex interrelations, with the consideration that the elimination of absolute poverty was the most important task facing mankind;

(*b*) With sensible and prudent use, the earth's minerals, energy, land, water and other natural resources appeared to be potentially adequate to cover the necessities of the growing world population for many decades to come;

(*c*) However, even currently, in various regions of the world, serious shortages of some resources were evident and there was a growing threat to the environment Some of the reasons for that included uncontrolled and irrational use of resources, absence of appropriate global, regional and national policies, inadequate socio-economic institutions and unsound biological and technological practices, as well as increasing demands resulting from population and economic growth. The resolution of those problems would not come quickly, easily or cheaply;

(*d*) Given current levels of technology and social, economic and organizational structure, current rates of energy consumption might not be able to continue for many decades ahead Since such rates of consumption were difficult to change, the world could face very serious problems in the near future Conservation policies would help and should be promoted vigorously;

(*e*) In some countries, resource and environmental problems were acute because of rapid population growth, coupled with inadequate institutional and social structures. That might lead to serious crises, including food and water shortages, hunger and increased rates of morbidity and mortality;

(*f*) Barring dramatic increases in death rates, it was virtually certain that the world population of 3 8 thousand million, would become at least 6 5 thousand million by the end of the century. That would occur despite efforts in many countries to implement family planning programmes, because of the enormous momentum built into population growth by the relatively young age of populations resulting from recent fertility rates. Unless policies to reduce fertility were extraordinarily successful, world population was considered unlikely to stabilize before the middle of the next century at less than 12 thousand million That increase would create additional obstacles to economic and social development, problems that could not be surmounted easily, plus many serious rural and urban environmental problems, in both developed and developing countries;

(*g*) Along with that growth in numbers would come an unprecedented increase in the number of persons living in urban areas By the year 2000, it was possible that more than half of the world population would live in urban regions, 80 per cent in developed countries and 40 per cent in less developed countries In absolute terms, that would mean an increase of nearly 2 thousand million city dwellers—about 450 million in developed and 1 5 thousand million in the less developed countries—in the course of one generation Such huge increments to urban human settlement would have vast global and national repercussions and would require major policy decisions and investment programmes just to maintain current levels of urban life, let alone improve it;

(*h*) That trend towards the concentration of population in urban and metropolitan areas would present mankind with the prospect of changes in life-styles of unprecedented magnitude Many human beings who, until recently, had resided in small communities, would have to adjust to high densities of mass societies. Changes might be anticipated in human interrelationships, family structure and function, systems of preferences and amenities, social organization and institutions The traditional order would be undermined and many frictions could become manifest in personal and social relations On the other hand, urbanism as a way of life would also open up new vistas for the expansion of human potentials, including new opportunities for education, science, technology, the arts and variations in life-style,

(*i*) The explosive increase in urban population would require bold and innovative policies and programmes if the [illegible]

economic and administrative as well as the physical changes;

(*j*) In many developing countries, a prerequisite of the improvement of agriculture and the rural economy might be more equitable distribution of land and access to public and private goods To the extent that land reform succeeded in giving land to the landless agricultural workers, it might also have a favourable impact on fertility. One cause of rural urban migration in most of the developing regions was economic and social stagnation in rural areas, as manifested in the high differential between rural and urban wages, the drab and unexciting social image of rural life and the absence of public services Rural development would, no doubt, lead to some lessening of rural out-migration, but it must be realized that with increased labour productivity in agriculture there might be a new impetus to migration from the countryside to the cities That called for a suitable national strategy to obtain a better balance in settlement patterns between urban and rural regions;

(*k*) A critical issue in the poorer regions of the world was not merely how to build cities that cost less, but cities that would provide more benefits to the poor. The "low-cost housing" concept was examined and found inadequate. The type of housing envisaged in the concept was generally [illegible] expensive that it was beyond the means of the urban poor. The needs of that majority were mainly for jobs and essential services—transport, water and waste disposal—and [illegible] darily for brick or concrete houses. Such houses in [illegible] countries were not essential and their construction [illegible] deferred. The concept of "no cost housing" was [illegible] possible alternative, the aim being to provide [illegible] the urban poor to construct houses themselves [illegible] land with materials they could afford, [illegible]

durability were to be sacrificed. The forthcoming United Nations Conference on Human Settlements at Vancouver in 1976 would take up those matters in detail;

(*l*) The problems outlined above required a unified analytical framework to be understood properly and an integrated set of policies to be effectively resolved. The typical sector-by-sector approach utilized by most administrations was no longer adequate. Participants of the Conference at Bucharest were therefore urged to give serious consideration to ways of conceiving a unified approach to development planning, and to methods of managing resources that would harmonize development goals with the need for environmental protection;

(*m*) As far as the developing countries were concerned, consideration of the problems mentioned above reinforced the conviction shared by many that steady economic and social improvement could not be achieved by merely following the historical development path of industrialized countries. New societal goals must be defined and development patterns outlined that would make the best possible use of available resources, including manpower. That would require new, appropriate technologies and far-reaching institutional changes. The new strategies should be ecologically sound, giving due consideration to environmental impacts. All countries were urged to establish population policies—that is, policies with respect to birth and death rates and migration—as an integrated part of eco-development policy;

(*n*) Participants were convinced that long-term and lasting solutions to the environment-resources-population-development complex in the rich countries would require a thorough redefinition of societal goals. In particular, wasteful uses of resources and uncontrolled growth of material consumption should be drastically curtailed. That was considered all the more important because an average person in a rich country, through his consumption, exerted a much greater pressure on the world's resources and on the global environment than did an average person in a poor country;

(*o*) A new perspective was considered necessary for Governments in the rich countries, which had historically been involved in promoting economic growth without regard either to its internal environmental impact or to global resources and environmental balances. The Symposium urged those Governments to redefine development goals so that increases in material consumption would cease to play the most central role. Emphasis instead should be put on widening the range of social and cultural services, so as to achieve a less resource-intensive and environmentally disruptive development profile. Such a shift would require changes in the pattern of society, including a drastic reduction of inequalities, and institutional changes. It was thought that political leaders needed to consider the range of desirable alternative futures;

(*p*) Efforts that could be made by each country on a national level, taking into consideration local conditions, demographic factors, resource availabilities, historical contexts, cultural patterns and political preferences, had been considered thus far. In addition, there were a number of important regional and global problems that required the common endeavour of all countries for resolution. The United Nations Conference on the Human Environment had outlined some steps to deal with threats to environmental resources that were the common property of all peoples on earth. It was understood that institutional changes would have to be made at the international level before a rational and equitable management of the world's material and environmental resources could be achieved. While that was a very ambitious task, mankind had reached a stage of its history in which such a reorientation was necessary in order to avoid social conflicts created by the unequal use of resources and technology within and among countries and to avoid possible ecological disasters;

(*q*) No policies to deal with problems of survival and growth on a global basis could win agreement unless they included measures to ensure that the poor of the world should achieve a reasonable improvement in living conditions;

(*r*) Some concrete international actions could be considere immediately as steps in the right direction. Those included world food security plan of the type proposed by the Foc and Agriculture Organization at its seventeenth session; a worl programme to provide clean water to the 50 per cent of th world population that, according to the World Health Organ zation, did not have access to such water; international effor to develop urban housing at a cost poor people could affor international agreements to control dumping and manage th extraction of minerals in the oceans; and a coupling of th "earth-watch" programme with co-operative international r search into the nature and functioning of the world's basi life-support systems;

(*s*) Whatever sense of optimism may be read into th report presupposes, among other things, rapid scientific an technological progress in certain directions. Goal-oriented r search efforts must be of a magnitude that would leave littl room for anti-scientific attitudes and polarization. Ways mu be found to reverse the recent declines in research budgets an in student enrolment in engineering and science in some devel oped countries;

(*t*) Put another way, the Symposium concluded that: i appropriate research efforts were not mobilized immediately; i the problems of the next century were approached on the basi of the simplistic ideologies of the last; if irresponsibility unde the cloak of sovereignty were tolerated further, and if the ricl countries did not give the problems of the underprivileged mor serious attention, then research priority should be given t relief and emergency planning, because a continued irrationa use of human and material resources would produce seriou problems;

(*u*) The world was faced with unprecedented problems i the interrelations of population, resources and environment Indefinitely continued growth in population and material con sumption was impossible in the finite space of the world Planetary disaster was not immediately in prospect, but it wa important boldly to face up to the formulation of national regional and global policies to avoid the deterioration of the biosphere and to improve the quality of life for all of mankind

II. Resources and environment

A. *Determinants of resource and environmental pressures*

23. Resource and environmental problems arose primarily in conjunction with the flows and use of minerals, energy and other resources through the economy. Other things remaining constant, that flow was closely related to the over-all size of the economy, an index of which was gross national product (GNP). Since GNP was by definition equal to population size times *per capita* GNP, that relationship was a convenient starting-point for discussions of the resource and environmental consequences of growth in population and the economy.

24. But in any long-run analysis other things did not remain constant. If technological advances made it possible to obtain the same output with less resources, or if tastes shifted away from material goods towards services, the impact of a change in population and *per capita* GNP on resource requirements and the environment would be less; on the other hand, if land of poorer quality must be called into production to satisfy growing food requirements or if more persistent forms of pesticides were utilized, the environmental problems associated with a given population and *per capita* GNP would be greater. The situation was complicated by the fact that most of the intervening variables were poorly defined; and they were characterized both by time lags—often quite long, between the introduction of materials into the economic system and their environmental effects—and by interactions among the variables and feedback loops, for example, from environmental changes to demographic changes. As a consequence of those complications, plus ignorance of the numerical quantities involved, no simple, yet reasonably accurate, way had been found to specify the relationships among the variables of principal inter-

est. It was possible, however, to list the major determinants affecting resources and the environment and try to keep all of them in mind when considering specific resource or environmental problems. For convenience, those determinants could be grouped into seven categories as summarized below·

(a) *Demographic variables* It was not just the size and rate of growth of the population that counted, but in different contexts, the sex and age structure, the number and size of family units, and labour force participation rates might all be important For example, they all influenced the volume and composition of consumer goods as well as the level and character of economic activities;

(b) *Level of living.* Quite clearly, that factor, measured very roughly by *per capita* GNP or income, plus its distribution among countries and among individuals within countries, played an important role in determining the level and types of material flows through both the world and national economies,

(c) *Style of living.* The style, or pattern of living, was important in determining the composition of output and the way that output was used An increase in *per capita* GNP would have less effect on the environment if it was accompanied by a shift towards services than if the composition of output remained constant. Similarly, a style of living that included throw-away bottles and high-compression motor-cars was more detrimental to the environment than one that paid less attention to packaging and more to mass transit;

(d) [illegible]

[illegible] cost of the collection and transportation of waste materials for recycling and waste treatment,

(e) *Technology* The technologies used at each stage of economic activity, ranging from mining and the transformation of energy, through transportation and production to the emission and treatment of wastes, could have significant effects on the nature and extent of [illegible]

Ai [illegible]

fo [illegible]

re[illegible]

(f) *International relations.* Often ignored but likely to play an increasingly important role in the future were international relations among countries, particularly the terms of trade at which resources and finished products could be obtained from abroad For example, the decision to set up atomic energy plants, with all the environmental problems involved depended in part upon the cost of alternate fuels, especially imported coal and oil,

(g) *Institutional and policy factors.* All the foregoing determinants were affected by such factors as patterns of capital and resource ownership, the organization of the market, the norms and rules governing waste disposal and land use, import policies with respect to fuel and minerals, decisions concerning the allocation of public investments and so forth If, for example, the use of common property resources, such as air and water, could be appropriately priced, there would be considerably more incentive to conserve them Similarly, the technologies used by less developed countries might be quite different if they had the means to develop technologies themselves rather than having to rely on transfers from developed countries

25. The relative importance of each of those factors depended upon a number of considerations, among which four were especially important. First, it depended on the time horizon considered in the analysis If the concern was for the subsequent few years—the time horizon of the typical economic planner—investments in municipal water and waste-disposal plants and restrictions on the use of motor-cars would be more effective than a slow-down in population or economic growth In some intermediate time horizon, all seven factors would come into play. In the very long run, at least according to many ecologists, population would emerge as perhaps the single most important factor.

26 Secondly, it depended upon the rate at which the various factors changed In many developed countries, growth in *per capita* GNP and shifts in the composition of output, for example, towards more energy-intensive goods, were more important than population growth In some developing countries with high rates of growth in population but not in *per capita* GNP, the relative importance was reversed

27 Thirdly, the relative importance of those seven factors depended upon the particular resource or environmental pressure under consideration. Population size was relatively more important than *per capita* GNP and its distribution in determining the need for resources for food production, but the latter were relatively more important in so far as mineral and energy requirements for consumer durables were concerned. The environmental problems associated with slash-and-burn agriculture, farming of marginal land, rural and urban water-supply and disposal of human waste were more related to demographic variables than were the environmental problems associated with transportation Lastly, relative importance depended upon the country and its stage of social and economic development. That was certainly the case with respect to developed and developing countries, both of which had serious, though often different, environmental problems, but it was also the case within each of those heterogeneous groupings of countries.

B *Population and resources*

28 The discussion covered three broad classes of natural resources—land and water, minerals and energy—and then environmental problems, beginning with global considerations and moving on to the special problems faced separately by the developed and the developing countries The breakdowns were adopted for purposes of exposition only, without pretence of covering the diversity of circumstances involved

1 *Land and water for production of food*

29 Considering the amount of potentially arable land in the world, the amount of water that currently ran off to the sea but that could be captured for irrigation purposes, and the high levels of yield achieved through the use of good management and modern, high-yield seeds and proper fertilizers, pesticides and water, the earth appeared capable of providing an adequate diet for many thousands of millions of persons more than were currently alive Indeed, the detailed calculations of one member of the Symposium indicated that with inputs and technology comparable to those of the typical Iowa corn farmer, as many as from 40 thousand million to 50 thousand million people could be provided with an adequate diet.

30 But that conclusion must be placed in the context of obstacles to the expansion of the earth's cultivated areas, increased yields and containment of environmental effects. Since the latter were dealt with later, reference was made in the discussion only to obstacles involved in increasing agricultural production

31 Before significant expansion could take place in the humid tropics, new technologies must be devised. There was reason to believe such technologies could be developed, but they were not currently available. Large capital investments were required for any major expansion of the cultivated area; indeed, one participant estimated that they would be of the order of from $500 to $1,000 per hectare. Some mechanism more effective than current international trading arrangements must be found to counteract the uneven distribution of population and the availability of potentially arable land To increase yields on currently cultivated land, farmers in developing countries must be able to purchase the modern inputs they needed, a requ rement that in many countries involved no less than the wholesale modernization of the society, general economic development and the ability to produce or acquire substantial quantities of mineral and energy resources Some of the additional land and water needed for agriculture must be obtained

at the expense of other uses, such as for industrial, municipal, recreational, and wildlife and wilderness areas. Irreversible loss of the latter could have serious long-term ecological consequences. Lastly, means must be found to mitigate whatever adverse distributional problems those developments generated and to provide productive non-farm employment for those who could not be employed effectively in agriculture.

32. There was a paradox operating in that matter. If all those requirements could be met, the modernization and improvement in the level of living inherent in that process would be likely to bring the birth rate down so that the full agricultural potential of the earth need not be developed. Yet, it might not be possible to accomplish all those tasks as long as population growth continued at its currently high rates. Especially in the more densely populated countries of the world, there appeared to be no alternative to working on both aspects at once: the attempt to modernize society and transform traditional agriculture and, at the same time, the attempt to reduce the birth rate through direct measures.

33. Land and water also were required for many non-agricultural uses, including industry, transportation, municipal requirements and recreation. Many countries, even those with large aggregate water-supplies, currently faced serious local shortages, and in all countries the protection of water from pollution was becoming one of the most acute problems of modern life. The resolution of those problems would be costly and in the process would give rise to other problems.

34. The oceans, because of their magnitude and importance as a medium of transportation, as a source of protein, petroleum and metals, as a potential source of fresh water, and at the same time, as a dump for waste products—including, in recent years, oil, metals, chemicals and radio-active materials—presented special opportunities and problems. Given foreseeable technologies, desalination was likely to remain a costly procedure. Many uses of the ocean required that it be protected from increased pollution. With the co-operation of all countries, such protection could certainly be provided, although, of course, at a cost. If, however, such co-operation was not forthcoming in the near future, the ocean's current and potential value for mankind might be seriously impaired.

2. *Mineral resources*

35. The Symposium was in general agreement that on a global basis the sheer physical availability of minerals would not pose any limit to population growth: man was far more likely to run into other barriers to growth in his numbers long before he ran out of minerals in any absolute sense. Considerations on both the supply and the demand side of the equation explained this conclusion.

36. Even in current times, large parts of the earth had not been explored in the detail necessary for resource discovery purposes. That was especially true of the sea-bed and in areas more than a few metres below the land surface; but it was also true of significant portions of the exposed land surface itself. Moreover, the average crustal rock was known to contain potentially useful amounts of important minerals and there was a tendency for the quantity of such minerals at a given concentration level to increase as concentration decreased, at least down to very low concentration levels. If the price of a mineral increased or the cost of mining went down sufficiently, it would not be surprising to find that the volume of mineable minerals increased by factors of hundreds.

37. On the other side of the equation, some doubts could be raised about the likelihood of demand continuing to grow at the high rates of the recent past. It was a commonly observed phenomenon that intensity of use (quantity per unit of GNP) tended to decrease as income *per capita* rose beyond a certain point. Most of the major consumers of minerals in the world were well beyond that point of maximum intensity. The prognosis was less clear for developing countries, which were just moving into the heavy industrialization phase of growth; it was difficult to predict how rapid their growth would be and to what extent they would follow in the footsteps of currently developed countries.

38. Much depended, of course, upon the rate and direction of technological change. But, it was suggested, the expansion of technological knowledge might be the steepest exponential curve of all. In that connexion, it was interesting to point out that the ability to utilize lower concentrations would permit mining in more and more regions of the earth, thereby helping countries currently considered devoid of economic concentrations of important minerals.

39. But before concluding that there would be enough minerals for future populations, five serious qualifications should be mentioned. First, if demand for minerals continued to grow, the attempt to mine, refine, move and utilize ever-increasing quantities of minerals would multiply pollution and environmental problems at even faster rates. That was especially true because of the ever-greater quantities of earth that must be moved and energy that must be applied to obtain minerals from lower concentration ores. Secondly, in strip-mining, as the grade of ore being mined declined, ever-greater quantities of land were required and its surface removed. The cost of reclaiming such land for other uses could become a serious problem, especially in semi-arid regions. Thirdly, ever-increasing quantities of energy would be required to ensure adequate mineral supplies in the face of increases in demand and declines in concentration levels. Such quantities might not become available in a timely fashion and, if available, might have serious side-effects of their own. Fourthly, since mining operations were by nature transitory, lasting only until the mine was exhausted, the introduction of greater rates of exploitation might involve greater rates of migration and social disruption.

40. Lastly, and perhaps most important, inequalities in the distribution of the world's income and wealth must be considered. Adequacy could be insured only for a country that had the socio-technical capacity to produce what it needed or the international purchasing power to acquire from abroad what it could not produce domestically. It mattered little to a country without such capabilities that there were adequate supplies elsewhere in the world.

3. *Energy*

41. Much the same picture emerged for energy, that is, potential abundance but emerging shortages given current modes of allocation and use. Energy was so important in permitting man to improve the conditions of life that it was most relevant to concentrate on gaining an understanding of the serious nature of the international, socio-economic, environmental and technical constraints involved.

42. By historical standards, the current conversion of inanimate energy by man was very large. Its use was very unevenly distributed, however, with some rich countries consuming on a *per capita* basis as much as one hundred times the consumption of some poor countries. Conversion was increasing rapidly, by more than 5 per cent per annum, about two and a half times as fast as population; and in the absence of dramatic increases in prices that could inhibit economic growth, many experts believed that that rate would continue for some time to come. Even if wasteful uses and commercial pressures to increase use were to be curbed, the efforts of developing countries to industrialize, plus greater needs for winning metals from ever leaner ores, obtaining fresh water and controlling pollution were likely to mean quite high rates of increase in demand for some time to come. In all that, the role of population growth was somewhat less important than growth in *per capita* income, technological change and the geographical distribution of populations and their economic activities. The explanation of that point required a review of the circumstances and prospects with respect to each major energy source.

43. Man was overwhelmingly committed to fossil fuels. Close to 97 per cent of his energy came from those sources. Total world reserves of petroleum liquids were considered adequate for several generations. But from one third to a half

of those reserves were located in a single region. Because of that and the fact that in many cases there were no substitutes [illegible]
similar magnitude and somewhat more evenly distributed than its remaining petroleum reserves. The rate of use of natural gas was increasing more rapidly than that of petroleum, though the total quantity used to date was much smaller.

44 World coal and lignite resources—over 97 per cent in the northern hemisphere—were about 10 times larger than world oil and gas resources If they could be used, it would be enough to support world industry for a few centuries But the environmental and social costs of a coal economy would be considerable and recovery of the reserves might be unacceptable in some regions unless the technology could be modified considerably. Known resources of high-grade oil shales were about one tenth as large as world oil reserves (mainly in the United States of America and in South America) Recovery of oil from those deposits could have even greater environmental impacts and higher direct costs than those for liquid petroleum Low-grade shales appeared very difficult to extract economically; it was therefore not of much use that they are far larger than total world oil reserves

45. Subject to many qualifications and delays, non-fossil fuel technologies could be further developed. Some would be most useful to high-technology societies, while others appeared suited to mainly agricultural and rural societies

46 There was ample fuel for nuclear fission for a few centuries without breeder reactors and for millenia with them, but neither technology appeared capable of sufficiently rapid development to meet the deficits likely to develop in energy supplies within the next few decades There were many as yet unsolved technical problems, and it was a slow and costly technology to put into world-wide operation Moreover, environmental problems, especially the need safely to store extremely lethal radio-active wastes for hundreds and perhaps thousands of years, plus the spread of materials that could be utilized for weapons of mass destruction, posed moral and ethical problems of a nature that man had never before faced The anxiety concerning those environmental problems within the technical communities of some countries was likely to cause increasing public pressure to hold up developments in that direction. Nuclear fusion might solve the difficulties, although there was still some debate about its environmental acceptability; but the best scientific opinion was that it would take several decades before the fusion reaction could become technologically and commercially practicable.

47. Hydroelectric power, currently providing about 2 per [illegible]
one [illegible]
irrig [illegible]
to d [illegible]
unle [illegible]
socially disruptive. Tidal power probably had an even smaller potential for economically practical development.

48 [illegible]
a manner that did not require a high technology society for its maintenance Environmental effects for solar power might be small. The technologies for large-scale use had not been developed and it was difficult to say when they would be. Other possibilities included the use of modern windmills, sea-thermal power and biomass conversion of agricultural and industrial wastes.

49 A number of participants voiced concern about one particularly difficult environmental problem related to energy use That problem pertained to the possibility of a change in the earth's heat balance, which at some point in the next century could cause major climatic changes throughout the world. It was a particularly troublesome issue because it was difficult to see any way that science and technology could be used to correct the problem In that case, the only solution in the long run might be the cessation of growth in energy use and conversion That problem should be the focus of far greater collaborative international research efforts than had been devoted to it so far

50 At best, those technological, environmental, economic and social problems involved in increasing supplies of energy would not be solved quickly As a consequence, unless dramatic technological breakthroughs occurred, there was a good chance that supply would not be able to keep up with the rapid increase of demand expected in coming decades, despite abundant potential energy sources The need for adjustments on the demand side could be so serious as to make many countries rethink fundamental social goals, especially as regards economic growth and the geographical distribution of population and economic activities While there was some dissent from that general message, all agreed that the problem required careful monitoring and far more serious study than it had been given

C *Population and the environment*

1 *Global and long-run considerations*

51 Environmental problems could usefully be classified into those with direct effects on human welfare and those with indirect effects The first category included damages to health and productive capital, social disruption (such as the displacement of populations as a result of hydroelectric or mining projects) and other direct effects on what people perceived as their "quality of life" Indirect effects on human welfare involved interference with the services provided for society by natural biological systems (such as the reduction of ocean fishing by pollution in coastal waters) Most public attention had been focused on the direct effects, and within that category on acute rather than chronic manifestations Far too little was known about what small amounts of persistent substances, such as chlorinated hydrocarbons, radiation, mercury, lead and DDT, might do to the human body when accumulated over 20- or 30-year periods

52 Nor were most people aware of the vast number of "public services" rendered by the natural environment. Almost all potential plant pests were controlled by natural ecosystems, only those of crops being controlled by man Insects pollinated most of the vegetables, fruits and flowers Natural vegetation reduced floods, prevented erosion and beautified the landscape. As the size of human populations and economic activities increased, man's potential for disrupting such systems grew. With the world population doubling in the next 30 or 40 years and economic activities at least tripling during that period, man's impact on these systems could no longer be ignored.

53 One should consider, for example, how the quest for high agricultural yields had led to the creation of monocultures in which large areas were planted to a single variety of rice or wheat. An unexpected disease strain or insect infestation entering such an area could cause enormous damage. Another example involved the disruption of heat balances and weather patterns as a consequence of ever-increasing uses of energy. Such disruptions had already been observed on a small scale in local areas If continued growth in the consumption of fuels caused such perturbations to occur over wider areas, rainfall and monsoon patterns could be affected

54 Non-linearities and time lags built into environmental systems might make the effects of small changes all the more serious when they did occur. If diminishing returns to the use of fertilizer and pesticides caused farmers to use more per hectare as population and the need for food increased, those chemicals would accumulate in the environment at a faster

rate than the rate of population increased. Moreover, for some pollutants, it was known that damage increased at increasing rates as concentration levels rose. Similarly, it was known that persistent pesticides and other long-lasting chemicals tended to become concentrated as they moved up the food chain.

55. Many such effects occurred only with a delay and thus could come unexpectedly. Time was required for persistent chemicals to concentrate in food chains; and quite often, as in the case of cancer and radiation, damage did not become apparent until long after exposure to the pollutant. The most pernicious example of such a phenomenon might be radio-active wastes from nuclear power plants. Minute quantities of such wastes could remain extremely damaging for thousands of years. Since the problems of safe storage for that length of time had not yet been solved, future generations might be committed to high risk each time the output of nuclear power plants was increased.

56. Far too little was known about such phenomena. The probability that a serious ecological disruption would occur could not be predicted, nor could much be said about the magnitude of the damage that might occur. The best that could be done was to state that the probability of such occurrences was above zero, that it was increasing with time as population and economic growth continued and that the consequences for life on earth as currently known could be very serious indeed.

57. Two important implications followed from those considerations. The first, of course, was the need for a great deal more research effort than had been devoted to those problems in the past. The second had to do with what constituted prudent behaviour in such circumstances. Until current ignorance in those areas was overcome, would it not make sense to refrain from introducing certain compounds and technologies believed to be environmentally damaging? In some cases, current benefits from the use of such materials and methods were so great that that path was not feasible. That might be the case for DDT in less developed countries, for example. In those cases, political leaders were confronted with extremely difficult choices.

2. *Problems of the developed countries*

58. The environmental problems of developed countries were sufficiently well known that they did not require characterization. But it was important to indicate that with current low rates of natural increase in population, those problems were probably less related to population growth than they were to growth in *per capita* output, and to the failure to develop proper policies and institutional arrangements to protect the environment. Population growth rates in most developed countries were not much above zero and might be falling. On the other hand, *per capita* use of minerals and energy was high and rising. In those countries which had not yet introduced stringent controls on pollution emissions and on use of land and water, such rising utilization rates could be expected to cause increasingly severe environmental problems. But the cost of protecting the environment might not be excessively large, at least not for the very rich countries, where, according to one study, adequate controls would not require more than 2.5 per cent of gross national product, at the very most.

59. The principal task facing developed countries, therefore, would be to search for and implement the policies and institutional changes necessary to create an adequate degree of environmental protection. Appropriate policies would differ, depending upon the particular problems faced and the economic capacities, social institutions and political realities of various countries. In general, there was considered much to be said for a policy of including environmental costs in prices, for example, through the use of emission charges levied on specific pollutants. Other environmental disruptions, certainly those of a severely damaging or lethal character, should be prohibited outright. A preferable approach for the longer run would be to restructure incentives so as to encourage the development and use of new technological processes that were not harmful to the environment. In some contexts, such a restructuring could be accomplished through tax preferences, research and development subsidies and regulations on access to raw materials and markets, but in other contexts, more fundamental changes in property rights might be required.

60. Often, however, the appropriate direction for policy was not clear. For example, metropolitan areas could be organized more compactly so as to reduce the need for private motor-cars, reduce the costs of providing mass transit and permit more efficient handling of sewage and solid wastes. Alternatively, future population and industrial growth could be guided away from existing large cities, giving up some economies of large scale to obtain some environmental and other benefits. While that and related issues were discussed elsewhere (see chapter II), it was useful to mention that far more research would have to be undertaken to assess benefits and costs of such alternatives before one could say with any confidence which direction was best in any particular case.

61. In addition to those policies, some participants advocated restrictions on the growth in *per capita* GNP in developed countries as a means of easing environmental pressures. That measure would have the additional advantage of conserving minerals and energy. Such benefits must be weighed against the social problems involved, some of which, such as unemployment and inequalities in the distribution of income and wealth, would be more difficult to solve in the absence of economic growth. Moreover, economic growth need not continue to entail the same composition of material commodities as it had in the past. If the proper policies were implemented, the composition of output would be forced to change in a favourable direction, and, incidentally, some modest reduction in economic growth would occur in the process. Such pros and cons must be carefully assessed before settling on a particular policy, and many value judgements would have to be taken into account.

62. Some participants were of the opinion that, even in the light of those considerations, there was still a role for population policy in developed countries. First, it would be wise to monitor the fall in birth rates and be ready with countervailing policies if it began to fall too fast or began to rise again by any significant amount. Secondly, population policy should pertain to more than national fertility, mortality and migration; policies designed to deal with the effects of environmental disruption on particularly vulnerable groups, such as the young, the elderly and the handicapped, and, in general, on human welfare and productivity, should also be taken into account. That latter view was challenged by some participants, who questioned the value of broadening the definition of population policy in that way, suggesting that if the elderly were not adequately taken care of by a society, it would be due to a failure to properly redistribute income and social welfare measures rather than to population policy.

3. *Environmental problems of the developing countries*

63. While less had been written about them, the environmental problems of developing countries might be more serious and complex than those of developed countries. In contrast to developed countries, most of their problems were associated with underdevelopment, that is, with a lack of adequate investments to correct the situation. That is certainly true with respect to water-treatment and waste-disposal systems, housing and public health facilities. Secondly, to the extent that industrialization, urbanization and rural development had occurred, they were often beset by problems similar to those of the developed countries, but without a commensurate ability to cope with them. Thirdly, the damages resulting from environmental deterioration might be more serious in their effects on health, labour and resources productivity and the quality of life. Soil erosion and losses in labour productivity resulting from water-borne debilitating diseases were just two examples. In principle, developing countries had the advantage of being able to learn from the experience of developed countries, but many of their problems were different and remained to be solved. In that situation, it was difficult to estimate the cost of environmental protection, but it was unlikely to be any less than that for the developed countries.

64 Population growth might [illegible] more difficult to keep up with the needed investments to correct the problems. In traditional agriculture in tropical and subtropical regions, an increasing pressure of population was more likely than in the modernized agriculture of temperate regions to produce various hazards to the environment, such as leaching of nutrients and degradation of farmland following deforestation, rapid soil depletion owing to permanent cultivation of land not suited for it, soil erosion, loss of forests and even climatic changes

65 Nevertheless, environmental deterioration in developing countries could not be ascribed solely to the size or growth of the population [illegible] used properly. Moreover, rapid rural-urban migration, which was not always the result of population pressure *per se*, tended to aggravate the situation, at least in urban areas which typically could not adjust rapidly enough to the increased demands put on the urban infrastructure.

66 The unprecedented nature and magnitude of those problems would require unprecedented remedies In all developing countries, a basic requirement was capital, both domestic and foreign savings to invest in the necessary facilities In some countries, a slow-down in population growth would be necessary, if for no other reason than to provide some breathing-space in the attempt to solve problems of past growth Beyond that, one must contemplate new patterns of development, patterns that would take advantage of but would not follow the experience of countries that had developed earlier, plus the use of new technologies specifically developed to meet local needs Developed countries could play a useful role in that process by helping to supply capital and research facilities, and by sharing their experiences in trying to cope with environmental problems.

III Population and human settlement

A. *Benefits and costs of alternative settlement patterns*

67. This section of the Symposium's deliberations focused on two questions. first, could an optimal city size be specified in operational terms; and, secondly, what could be said about "desirable" national population distributions among centres of different sizes.

68 On the first question, the members of the Symposium agreed that it was not possible to say with any confidence that some cities were too large and others too small Four interrelated reasons explained that conclusion First, the shape and cost and benefit curves could not be specified. Secondly, such curves would be made up of different components and could not be quantified objectively, quantification could be accomplished only by assigning weights based on subjective value judgements Thirdly, the appropriate distribution of city sizes probably varied significantly over time and space, and often by more than man's ability to influence the situation Lastly, those who claimed the existence of an optimal city size tended to over-emphasize the social costs, to understate the economic benefits and to ignore the social benefits.

69 Real income was positively associated and poverty was inversely associated with city size The relationship between city size and density, on the one side, and environmental costs (air pollution, traffic congestion etc), on the other, was unclear. while potential damages per unit of space were greater in larger, more densely populated areas, there were economies of scale in the provision of social overhead capital and control measures to clean up the environment For some phenomena, there was a relationship between high densities and social costs, suggesting that city size was merely an intervening variable.

70. That was not to say that some cities were not growing too fast. Indeed, many problems commonly associated with large cities—social disruption, unemployment, poor housing and social services—might be more closely related to rates of change and patterns of physical administration and organization than to size *per se* Given some respite from the continuous and rapid influx of migrants, cities could probably make an adequate adjustment to that influx A second important qualification was that while big cities promoted growth, the gains might accrue to landowners and owners of capital, thereby making for inequality It was unlikely, however, that much scope existed for correcting the situation by trying to alter city size The first problem highlighted the need to intervene to keep population growth and provision of urban services closely in step, while the second called for extensive policies for redistribution within cities

71 A similar conclusion applied to the search for an optimal or near-optimal national settlement pattern given the current state of knowledge, that search was considered unfruitful However, it was considered clear that alternative spatial distributions had differing economic, social and political impacts Also, some patterns might be preferable to decision-makers and to society as a whole Such preferences could only be revealed if alternative "scenarios" of the future spatial distribution of population were brought into the forum of public discussion

72 There was no evidence available to suggest that a particular spatial distribution of population would minimize the strain on natural resources As for pollution and other forms of environmental disruption, tampering with the settlement pattern (either as a whole or in individual cities) was considered—in the short and medium terms, at least—an ineffective instrument compared with compulsory environmental standards or pricing, taxation and subsidy strategies

73 Primate city size distributions in developing countries appeared to be consistent with economic efficiency, offered the opportunity for personal income gains and did not conflict with equity objectives, if only because rural conditions were so bad In terms of long-term development goals, the reduction of primacy might be a legitimate policy goal, but implementation might be harmful to both the rural and urban populations unless associated with effective development strategies that would improve job, income and social opportunities in smaller cities and in rural areas

74 It was difficult for Governments to alter the national settlement pattern The location of infrastructure, if determined in the light of population distribution goals rather than by responding to spontaneous growth and movement, would, of course, have some impact, but even in countries with high [illegible] and controls were less effective instruments than urban infrastructure location decisions, interregional transportation strategies and policies for distribution of industry.

75 These mildly negative conclusions about policies designed to improve urban size and settlement patterns did not suggest a total switch of attention towards aggregate population measures, as there was a wide range of urban policies unrelated to city sizes that influenced as well as responded to population growth and change In other words, there was a distinction between urbanization policy and urban size policy. In the former, spatial and non-spatial policies intermeshed on the urban plane, while the latter was concerned with the size of individual population concentrations, and more generally, with the size and spacing of centres in the national settlement pattern. Even if little could be done on the urban size front, either because the evidence indicates that intervention would be harmful or because of a lack of sufficient understanding of the relationships between a particular national settlement pattern

and efficiency, equity and environmental goals, there, nevertheless, remained considerable scope for the co-ordination of policies (sectoral as well as spatial, national and regional as well as urban) that influenced urbanization trends and population change and distribution. Those policies should, *inter alia*, ease the transition from rural to urban life, attempt to improve the welfare of both urban and rural populations, promote redistribution within and between cities, be broadly consistent with economic and social efficiency criteria, and induce neither a higher rate of resource utilization nor additional environmental deterioration.

B. *Internal organization of metropolitan areas*

76. The efficiency of individual cities in providing for human needs might depend more upon internal organization and structure than upon population size *per se*. Nevertheless, as had previously been stated, the speed with which a city's population increased was important, since rapid growth aggravated the problems of adjusting internal organization and structure to requirements

77. Much of the discussion about internal organization centred on strategies for controlling land use, it being recognized that the distribution of income, wealth, housing and social services was greatly influenced by the way urban land was allocated and used. Government authorities must acquire sufficient control, either through ownership or regulation and zoning, so that priority could be given to uses that contributed to the needs of the majority of the population, not just to the private owner, developer or speculator whose decisions were, in the absence of regulation, responsive only to market incentives

78. While housing typically absorbed a large fraction of the capital invested in cities, many participants expressed the view that it was often given too much priority in developing countries The needs of the majority were for jobs and essential services, such as transport, water-supply and waste-disposal facilities, and only secondarily for housing. In that connexion, the concept of low-cost public housing was examined and found to be inadequate. Often, that concept meant capital-intensive, permanent dwellings of brick or concrete that typically were not essential in tropical countries and often turned out not to be "low cost". As a consequence, such dwellings tended to be beyond the means of the urban poor who needed them the most. Several participants suggested substituting the concept of "no-cost housing", by which they meant the provision of improved land, plus water and sewerage facilities, to the poor, who would then be permitted to construct houses with materials they could afford The provision of technical assistance and some materials by public authorities might be beneficial. An important secondary benefit of that approach was the fact that it was likely to absorb substantial amounts of otherwise unemployed labour during the construction phase. Densities would not need to be much lower than in a high-rise approach.

79. Financial strategies for urbanization also came under discussion. One such strategy, which had been applied in the development of Bombay II, a new town located on the outskirts of the original city, involved the purchase of land which, after development, was sold or rented in order to finance the original purchase plus the investments in infrastructure and mass transit. Other approaches to solving that and related problems of internal organization were also raised and discussed.

80. Note was taken of the importance of the forthcoming United Nations Conference on Human Settlements, to take place at Vancouver in 1976, where there should be an opportunity to pursue those issues in more detail. It was hoped that policies with respect to rural-to-urban migration, urban slums, urban land use, financing of low-cost housing and environmental management could be recommended at that time.

C. *Location policies and experiences relevant to rural development*

81. In 1970, 72 per cent of the world population had lived in rural areas and 82 per cent of all rural inhabitants had lived in developing countries. Despite the very rapid increases in the world's cities and towns due to rural-urban migration, the over-all rural population was continuing to grow in absolute size.

82. The preoccupation with urban pollution and sanitation problems led to underestimates of the urgency of environment problems in rural areas of developing countries. Floods, deforestation, soil erosion, absence of clean water and inadequate public health facilities were only a few examples. Full understanding of those problems and efforts to formulate appropriate policies and programmes for them were very important in tackling the question of population and environment. In those circumstances, the tendency to look upon rural-to-urban migration as a nuisance and to assume that urbanization was occurring "too rapidly" was an oversimplification of the problem It ignored the positive role of migration in relieving rural poverty in developing countries. No matter how bad the situation was in the cities, it was unlikely that large-scale migration would be occurring if conditions were not still worse in the countryside.

83. The success of policies designed to slow the rate of urbanization in developing countries depended to a considerable extent upon the ability to generate rural and agricultural development An important way to give urban areas the breathing space they needed to solve their problems was to develop sufficient job opportunities, higher *per capita* incomes and public services in rural areas so as to reduce out-migration.

84. Accordingly, planners would be well-advised to consider whether the allocation of social overhead capital, which all too often favoured urban areas at the expense of rural, was appropriate But in many developing countries, more than capital was needed for the modernization of agriculture and the rural economy. Often, reforms and some redistribution of wealth were necessary as well, if tenants and the landless were to be encouraged to stay in rural areas.

85. It was of interest to note that such rural developments might also be necessary to create a desire for smaller families and therefore make family planning programmes effective in rural areas. A number of participants expressed the opinion that the absence of personal security, with respect to health, old age, employment and income, was closely linked to the desire for large families and that priorities for rural development should take their cues from that fact.

86. A number of examples from different countries were provided, and with the case of China was discussed at some length. Modernization there appeared to be less a consequence of technological change, such as the introduction of new seeds, than of a purposive and orderly organization. It had involved the use of highly labour-intensive methods in agriculture and construction and the location of many small-scale industries in the countryside not only for agriculture, but for building roads and houses. Efforts were being made to provide environmental sanitation and basic public health facilities, and responsibilities were clearly laid down with respect to the provision of old-age and other forms of social security. Family planning programmes were being pursued vigorously. The consequence of those and related measures appeared to be some restraint on population growth and a significant slow-down in rural-to-urban migration. Some loss in efficiency due to the rural industry programme was also mentioned. That, plus the other examples cited, served as illustrations of what could and was being done about problems of human settlement related to rural development.

D. *Location policies and experiences relevant to urban development*

87. Despite the best efforts to improve rural life in developing countries, the population of both large and small cities must be expected to continue rapid growth during the remainder of the century. Given that growth, perhaps the best that could be done would be to attempt to spread it out among cities of various sizes in such a way that growth rates would be lowest in those cities where facilities were the most overloaded. It was

generally thought that that meant attempting to divert the flow of migrants away from the very large metropolitan areas and towards medium-sized cities and major provincial centres, but that proposition should be carefully examined in specific contexts. It might well be, for example, that some larger cities were uniquely situated to attract capital and central government revenues and therefore could adjust to the influx of migrants more easily than smaller cities

88. An alternative approach involving the establishment of new towns had been used to good effect in some countries. If a new, independent, administrative unit could be established with authority and capacity to acquire land or to control land use, and to invest in the development of the necessary infrastructure, the new town approach could work well It was also useful as a means of experimenting with new organizational and structural patterns. But that approach could be both costly and risky costly at least in the short run because infrastructure must be built from scratch, and risky in that planners might not be as wise as market forces in selecting sites that were capable of becoming economically viable in a reasonable period of time At best, new towns were unlikely to absorb a very *large fraction of those* seeking urban residence in countries with rapid rates of population growth and migration

89. In either event, careful thought must be given to the choice of regions, to the possibilities of sustaining viable economic development without unacceptable ecological damage within those regions, to ways in which the economies of the urban centre and its larger region could be integrated and to planning techniques that would maintain a maximum degree of flexibility. Spatial planning undertaken at the national level, while necessary to set over-all guidelines, should not be permitted to become very detailed and rigid Of more importance was the development of competent local planning bodies with the authority and capacity to implement their plans Even at that level, it was wise to proceed cautiously, in relatively small, incremental steps, so as to minimize the chances of making very large, costly errors. The experience of various countries was reviewed to illustrate those general principles

IV. Impact of technological innovation and transfer of population

90 An intimate link was evident between demographic trends and the nature of the technology that existed in, or was imported into, a society High post-war rates of population growth had resulted in part from the introduction of new medical technologies, and that, in turn, had contributed to unparalleled levels of unemployment and other social problems in many developing countries. Those problems were often exacerbated by attempts to apply technology not suited to local conditions, for example, capital-intensive technologies in capital-scarce, labour-abundant countries and temperate agricultural techniques in tropical areas.

91 Among future technological transfers, high priority should be given to innovations that would tend to correct current and prospective imbalances between population and food and other resource supplies. Apart from the urgent need for further direct efforts at fertility limitation, the introduction of labour-intensive technologies that would not produce excessive sacrifices of productivity, and of patterns of production that would encourage fertility decline should become central considerations in development planning. Such production patterns should include concentration on mass-market goods that would provide an incentive to control family size, and the organization of production to maximize the employment of young women. Institutions and organizations engaged in technology transfer should take into account the recipient country's employment situation and resource structure as well as its environmental susceptibility to the new technology.

92. When developing countries were in a position to make autonomous decisions regarding the type of technology to be employed, their absence of structural commitment to large-scale, high-impact technologies gave them a greater potential flexibility over the choice of innovation than that enjoyed by highly industrialized societies. That factor might be greatly to their advantage in the long run if they had practical access to knowledge of alternative technological choices

93 It was important for Governments of developing countries to remember the extent to which the values of their societies (on which their technological choices must be based) might be influenced by the demonstration effects of high-consumption societies Looking further into the future, it was [illegible] development Some participants foresaw the time when that new pattern would mean the close of the current era of material acquisition as a means to fulfilling psycho-social needs and the opening up of new possibilities for the underprivileged in both developed and developing countries

94 The Symposium time and again emphasized the need for a rather different technology in the poor countries, one that would be sufficiently employment-intensive and capable of preventing spreading unemployment, poverty and inequality No accurate method existed for measuring the structure of world technological power between the poor and rich countries, although the research and development expenditures—expenditures on applied research and experimental development in scientific and technical institutions leading to technological innovation—could reflect and provide a rough and practical measurement The share of poor countries in world research and development expenditure was considered to be extremely low—about 2 per cent

V Critical review of population-resources-environment models

95 A significant and growing number of models dealt with population, resources and the environment. They differed in their coverage of those three topics, in their treatment of the linkages between them, in the extent of their geographical coverage and in the time period studied Those models could also be classified by purpose, some were meant solely to illustrate the operation of physical and economic laws, and, as such, were very useful for educational purposes. Others were normative in the sense that they attempted to assess the consequences of different policy actions Still others were positivistic and attempted to predict or extrapolate the consequences of current trends Lastly, there was a type of model that was principally useful as a consistency framework, to bring together bits and pieces of specialized knowledge in an orderly way, making it easier to discover inconsistencies and gaps in the knowledge base. It was important to recognize that a model designed for one of those purposes, or covering a particular space and time dimension, usually was not appropriate in other contexts.

96. Most of those models introduced demographic considerations as independent variables, affecting but not being affected by economic and other variables Although significant progress had been made recently in introducing interactions [illegible] mechanisms

97. The time period covered by those models was an important characteristic. All of those reviewed by the Symposium were meant to be applied to the future rather than to the past, with the consequence that the validity of their conclusions could not, or at least had not so far, been tested against actual events. Moreover, the attempt to cover longer and longer time periods into the future, while important in studying population-resource-environment interactions, introduced ever-greater com-

plications for the model-builder because fewer factors could be held constant. A short-term model could, as a first approximation, ignore changes in tastes, institutions and technology; a long-term model could not, even though it was extremely difficult to estimate how such factors would change in the future.

98. The best models were those which were capable of absorbing large quantities of reliable data. While that presented problems of tractability, it became a crucial point as models expanded in time and space. As a corollary, it was also desirable to construct models that were sufficiently disaggregated so that major interrelationships—for example, substitution possibilities—would not be overlooked. A high degree of aggregation tended to hide interrelationships and effects which could be very important for the correct interpretation of the phenomenon studied. For example, models that treated the world as a whole tended to obscure the effects of any given policy or development on poor countries. Such global models did little more than illustrate obvious conclusions about the finite nature of the world; indeed, they sometimes did harm by purporting to add an unwarranted degree of precision to such conclusions.

99. Great attention should be given to regional and national differences in the selection of the variables and parameters to be used. A highly detailed model for a country or a region might not be appropriate for use in another region due to, among other things, the lack of reliable information on the variables selected, or to a different economic or social structure, which might make irrelevant some of the central elements of the model.

100. It was necessary, in each case, to specify clearly the objectives, structure, assumptions and conclusions of the model. That was essential to avoid misinterpretation of the real significance of the results. Models were an aid to thinking; they should not be used as a substitute for it.

101. More empirical research was needed to reach an adequate understanding of the relationships among population, resources and environment, in order to construct models increasingly representative of the real behaviour of the world. Such work must be accorded high priority. Until good empirical material became available, those models would be of limited use. Their principal value would be for educational purposes and as a guide to identify where the priorities for more empirical research lie.

VI. Research implications

102. In the course of their deliberations, the Symposium participants became increasingly concerned about glaring gaps in the state of knowledge about many life and death issues that faced the human race. As stated in the introduction, whatever sense of optimism one may read into this report presupposes continued rapid scientific and technological progress in certain specific directions. While a substantial degree of continued progress could be expected, several participants voiced concern about both the magnitude and direction of the changes that were likely to occur. A decline in university enrolment in some scientific fields, weakening financial support for fundamental science, and a concentration of research and development expenditure on military, space and the consumer needs of wealthy countries were a few of the signs that were mentioned. It could not be assumed that scientific and technical advance would continue at an adequate pace to solve man's most pressing problems unless the massive efforts necessary to validate that assumption were in fact made.

103. As the various sections of this report suggest, there are serious gaps in knowledge in all fields reviewed by this Symposium. While many such gaps were identified, it was beyond the scope and mandate of the Symposium to work out priorities among them. Nevertheless, a number of general guidelines were suggested.

104. First, the needs of developing countries should be given much higher priority. Much of the work pertaining to those countries would have to be interdisciplinary, cutting across traditional academic and scientific fields. One example was research on agriculture in the humid tropics, where viable solutions could be found only by combining the efforts of agronomists, ecologists and economists, to mention just three of several essential disciplines.

105. Secondly, the research should emphasize empirical and experimental work. Choices among theoretical models and hypotheses would need a stronger base of data gathered through experimentation. The participants took note of a number of interesting suggestions for resolving specific problems; but in each case there was no way to know whether the suggestions would work without actually trying them out in the field. Thus, for example, self-help or "no-cost" housing was a possibility that needed substantially more field-testing. Similarly, the only way to determine whether improvement in an individual's sense of security would induce him to have fewer children was to observe his behaviour when he was provided with such security. In recent years, a number of proposals to establish field experiments to test such ideas had been developed and a few had been implemented to good effect. Such efforts needed encouragement.

106. Thirdly, emphasis should be placed on projects suited for joint research efforts by both developed and developing countries. It was considered clear that developing countries did not have the scientists and the funds available to undertake all the necessary work required; but it was also clear that solutions developed in richer countries were not always appropriate for poor countries. Joint research efforts would facilitate the transfer of techniques and the development of new ones particularly suited to the needs of developing countries. Several fields of research appeared particularly suited for this approach. Those included efforts to achieve greater efficiency in the use of energy, the development of solar and geothermal energy sources, forest management, research on factors affecting land use, integrated pest control, rural water-supply and waste disposal, the development of new materials for construction and manufacturing industry and the development of ecologically sound technologies for less developed areas.

107. Fourthly, in establishing research priorities in areas related to improving human welfare and living conditions, priority should be given to those projects most likely to influence demographic behaviour in desirable directions. That point suggested, for example, giving priority to such areas as rural development, public health and new methods of primary and secondary education, on the assumption that improving and making more secure the conditions of rural life, and providing new opportunities for individuals, would make large families less necessary and desirable. That assumption needed empirical testing, as indicated above, for example, through the use of field experimentation.

108. Fifthly, population-influencing policies in the poor countries were not an end in themselves—their justification depended on the contribution such policies could make to over-all social and economic development. Conversely, certain types of development policies, for example, policies to increase GNP without regard to income distribution and the welfare of the great majority of the people, were liable to have little effect on the average fertility in developing countries. Both empirical and analytical research were needed to find better ways of integrating development policies and population policies. Historical and comparative studies could be a powerful tool for that research.

109. Sixthly, in problems of urbanization, much could be learned by placing greater emphasis on historical and comparative studies of the urbanization process in different countries at different times.

110. Some other specific areas of research that participants suggested should be given more emphasis are listed below:

Population and resources:

1. Surveys to identify and evaluate existing natural resources in developing countries;

2. Problems of food production in the humid tropics;

3. Methods of maintaining genetic variety;

4. Methods of bringing about agricultural modernization;

Population and environment:

1. Environmental factors in health, morbidity and mortality, and their economic and social effects;

2. Ways to reduce the environmental impact of recovery, transport and use of energy;

3. Environmental impact of the flow of population from rural to urban areas,

Population and settlement

1. New forms of human settlement, taking into consideration the modern revolution in communications,

2. Primacy of metropolitan cities: its impact on regional welfare;

3. The impact of high population density on the human environment: thresholds for external diseconomies;

4 Effects of political and institutional frameworks upon urban development;

5. Comparative studies of the goals, instruments and efficiency of policies relating to the ownership of urban land in countries with different socio-political framework;

6. The relationship between alternative national, regional and intra-urban settlement patterns and (*a*) rates of resource utilization; (*b*) disruption of the natural environment, (*c*) creation of pollution and congestion

Appendix

AGENDA

1. Opening of the Symposium
   (a) Opening addresses
   (b) Election of officers
   (c) Adoption of the agenda
2. Population and natural resources
   (a) Land and water resources
   (b) Mineral resources
   (c) Energy resources
3. Population and environment
   (a) Environmental problems of the developed countries caused primarily by their advanced industrial structure
   (b) Environmental problems found mainly in the developing countries as a result of poverty and under-utilization of resources or imports
   (c) Global environmental problems derived from man's potential for modifying the resources in the global ecosystem
4. Population and settlement
   (a) Benefits and costs of alternative settlement patterns
   (b) Internal organization of metropolitan areas
   (c) Location policies
      (i) Policies and experiences relevant to rural development
      (ii) Policies and experiences relevant to urban development
5. Impact of technological innovation and transfer on population
6. Critical review of population-resources-environment models
7. Interactions of population, resources and environment
8. Adoption of the report
9. Closing of the symposium

Annex III

REPORT OF THE SYMPOSIUM ON POPULATION AND THE FAMILY

Introduction

1. The Symposium on Population and the Family was held at Honolulu from 6 to 15 August 1973. It was one of a series of symposia held in preparation for the World Population Conference, 1974, as recommended by the Population Commission at its sixteenth session [1] and endorsed by the Economic and Social Council in its resolution 1672 (LII).

2. The Conference, as endorsed by the Economic and Social Council in its resolution 1484 (XLVIII), is being organized as a meeting of Government representatives. It will differ from the World Population Conference, 1974, held at Rome, and the World Population Conference, 1965, held at Belgrade, which were technical meetings. Therefore, a series of scientific activities was planned in preparation for the World Population Conference, 1974, to identify and clarify critical problem areas at the technical level.

3. Among those pre-Conference activities were four symposia on: population and development; population and the family; population, resources and environment; and population and human rights. Those were technical meetings of experts participating in their personal capacity.

4. The Symposium on Population and the Family was organized in collaboration with the Government of the United States of America. Host facilities were provided by the East-West Population Institute of the East-West Center, Honolulu, which acted as agent for the Government. The meeting was made possible through the financial assistance of the United Nations Fund for Population Activities. Twenty-six experts in the fields of demography, sociology, anthropology, economics, psychology, cultural geography and social welfare participated in the meeting. Those experts were a broad interdisciplinary group of specialists, all with a particular interest in the population aspects of their field of specialization. The consultation with the experts was organized to take the form of a discussion and exchange of views centring around three substantive agenda items leading systematically to the crucial and concluding fourth item on the benefits and liabilities of population and other public policies for the family and society.

5. As bases for the discussions, participants were provided with technical papers prepared by experts especially for the symposium, and draft background papers prepared for the Conference.

6. The meeting was opened by Everett Kleinjans, Vice-Chancellor, East-West Center. The Secretary-General of the World Population Conference, 1974, expressed the appreciation of the United Nations to the Government of the United States of America for its collaboration in convening the symposium, to the East-West Center for its hospitality and to the participants for their contribution to the work programme of the United Nations. He traced the concerns of the United Nations world conferences in the fields of population, noting the logical movement towards the current emphasis upon policy. He elaborated upon the place of the symposium in the programmes and activities of the World Population Conference, 1974, and reminded the experts that they had the task of formulating the scientific opinion that would be brought to bear upon relevant issues before the Conference. The Director of the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat outlined the particular issues relevant to population and family to which attention would be directed during the deliberations and set forth a broad framework within which discussions of those scientific concerns might yield conclusions as to policy options and implications.

7. L. Tabah served as Director of the Symposium and J. A. Palmore acted as Co-director. The meeting elected C. Chandrasekaran as Chairman and G. J. A. Ojo as Vice-Chairman. Jean Thompson was appointed the General Rapporteur; Kathleen M. Jupp, Co-ordinator, World Population Conference, 1974, and World Population Year, 1974, Population Division, acted as co-ordinator; and Gwendolyn Johnson Acsádi, Population Division, was designated as Technical Secretary. The following participants were appointed as discussion leaders: Judith Blake Davis, Laila El-Hamamsy, M. Livi-Bacci, L. Ratinoff and G. W. Roberts. C. F. Westoff was appointed to present an overview of the symposium. The following participants served as rapporteurs: S. del Campo, Margarita M. Errazuriz, Sattareh Farman-Farmaian, J. T. Fawcett, K. Kulcsar, H. V. Muhsam and Mely Tan.

8. The meeting adopted the agenda represented in the appendix to this report.

9. The opening item dealt with the cultural and historical perspectives of the effect of modernization on the family—its size, composition, structure and functions. Emphasis was given to those aspects of family change thought to have significant implications for population trends. Stress was also laid upon the variations in the historical evolution of the nature and functions of the family that had taken place among different cultures. Particular note was taken of the dissimilarities in the evolutionary process as it had occurred in the currently developed regions and as it was occurring in the developing regions. The objective was to focus attention on: (*a*) different types of families and their relationship to conditions of development; and (*b*) transformations in the family and its adaptation to changing conditions of development and population dynamics.

10. Conditions and changes that have a bearing upon the family cycle—its formation, development and dissolution—was the subject of the second agenda item. Three distinct, but interrelated, types of factors were identified:

(a) *Demographic factors* such as health, mortality, nuptiality, reproductive patterns and migration;

(b) *Development factors*, such as conditions of employment, development policy, urbanization, industrialization and education;

(c) *Socio-cultural factors*, such as the role of the family in society, value and belief systems, definitions of intrafamily roles and the roles and status of women and children within the family and in the society as a whole.

11. The discussion of various factors producing changes in the family cycle led naturally to the third agenda item: the influence upon family life of changes in the family cycle. Two types of influence were [illegible] ut for review and analysis: (*a*) aspects of urbaniza [illegible] al migration [illegible] the modernization of repr [illegible] ur repre [illegible] shift from high to low [illegible] th ty

[1] See *Official Records of the Economic and Social Council, Fifty-second Session, Supplement No. 3*, para. 166.

problems

12 *The final item of the agenda* was concerned with the policy implications for population and for the family of the problems raised in the earlier discussions In view of the changing social institutions and conditions of development in the economically less advanced countries *and of the increasingly* enlarged role of the State in the care and protection of indi-

I. Population and the family cultural and historical perspectives

13. A great variety of forms of family organization had evolved throughout the world and many forms currently coexisted. The long perspectives of the historian and anthropologist *provided a reminder that mankind, for the overwhelming part* of his existence, had lived in hunting-gathering groups; agricultural man, and particularly urban man, had emerged only within the past 10,000 years. Social institutions were still being developed to organize life within that relatively new economic

14. In light of that, an important question to which the

in particular, towards the small nuclear family as the basic unit of society

15. It was acknowledged in the discussions that change was a basic element in human life and experience The nature of the family and its functions in the lives of its members and in society had varied in time and place Economic and social *development, the modernization of society and demographic* changes had caused fundamental alterations in family structure and roles. Because the family was the basic intermediate variable in reproductive behaviour, its nature as an institution and the modifications in it over time had influenced demographic processes and other related phenomena.

16 There had been emerging in recent years dissatisfaction with existing knowledge, which was essentially the result of

solve the practical problems of concern to Governments, policy in that field was ultimately implemented by individuals or *couples*

17. In particular, where policy measures were designed to initiate or to accelerate some specific change in society, it required the scientific identification of options open to decision-makers and the assessment of consequences of *adopting the* options. Expert scientific opinion was needed to fill the wide gaps in existing knowledge as to the mechanisms by which the economic and social transformations wrought by the process of *development and modernization—through their* effect on the structure and functions of the family—induced significant changes in attitudes and behaviour in reproduction at the individual or micro-level. Analysis at that level, with due regard for the diverse circumstances and conditions that prevailed throughout the world, would provide a basis for specific recom mendations useful for national or regional policy

18 There were major weaknesses in the state of knowledg about the functioning of the family and of the means whereb modernization occurred and by which it brought about modifi cations in family structure or behaviour. In part because o the existence of a wide variety of forms of family organizatio throughout the world, there was no internationally accepte definition of the family as a sociological-anthropological con*cept The term "family" might refer to the nuclear form* generally considered to be confined to the husband and wif and their unmarried children, or it could refer to familie

might not be a typical feature of developing countries, larg kinship groups often existed in which relatives living apar from the household were bound together by elaborate system of obligation and mutual aid and were capable of exercisin influence over behaviour in such matters as reproduction Fo purposes of sociological analysis, those kinship groups migh be more pertinent than residence groups and, as mentione elsewhere, it was therefore important to distinguish betwee the two

19 To explain the interrelationship between social chang and family form and structure, a distinction was made betwee biological factors and non-biological factors (social, economic, cultural etc) The human species exhibited some distinctive biological characteristics in particular, there was a relatively *long period of child dependency All that had resulted in a* organization of the human family that was based in general on a relatively stable, generally monogamous, marital union. Although norms varied, the objectives of marriage control were to confine procreation within a stable relationship Cultural variability was a result of the socialization of children through the family and the community The question was whether that variability was desirable It was claimed by some that the vigour of the human species might lie in deliberately preserving heterogeneity in its biological and non-biological characteristics.

cations for family structure

20 There were a large number of social, economic and cultural factors, built upon that biological foundation of the *institution of the family, which contributed to the cross-cultural* variation in family patterns Among them were the mechanisms for choice of marriage partner; attitudes towards celibacy, and the status that it is given by society; social controls over reproductive behaviour outside the family unit, rules about legitimacy status and other norms concerning ownership of property and its inheritance, regulation of the marriage of widows; association with the family (such as adoption etc), and dismissal from it, types of economic organization; and different uses of manpower and their effect upon the usefulness of children or the economic burden imposed by them.

21 The family entailed a network of rights and obligations among its members, from the care of the young to the support of the aged Consequently, the *family* might be considered an adaptive institution of great strength, in the sense that most of the patterns referred to had already undergone marked changes with the arrival of industrialization and urbanization. The family had a considerable capacity *to renew itself* and even

social institutions.

22 As to whether the family could be a force for social change or whether it merely responded to changes in the larger

socio-economic context, there was a relatively wide range of opinion. At one extreme was the stress placed on the adaptability of the family, which gave it an actual or potential role as a force for social change. At the other extreme was a body of opinion which either explicitly or implicitly rejected the notion of the family as an independent source of cultural norms.

23. Important changes in family structure were generated by industrialization and modernization; extreme examples of such changes were found in cases of rural-urban migration. The latter had an important effect upon the breaking-down of traditional procreation controls, for instance, in regard to traditional periods of abstinence and to post-partum taboos. Some studies had revealed shorter birth intervals among urban than among rural women in West Africa, due to a less consistent practice of post-partum abstinence and the substitution of bottle-feeding for breast-feeding. A characteristic of the modernization process was that the State and other public institutions assumed increasingly greater responsibilities in relation to those that remained with the family unit itself. However, rather than diminishing the importance of the family, modernization created for the family new sets of obligations.

24. It also was necessary to take account of the dysfunctions of the family, such as the perpetuation of social stratification, in either its current or emerging forms. According to one school of thought, the very tenacity of the family might impede the development of individual values and hinder changes in roles which some considered to be the essential correlates, if not precursors, of the modernization process. From that point of view, the family was not an independent source of social norms; it could create some imbalances within the society because of its inherent tendency to lag behind changing conditions, that is, to maintain earlier patterns of adaptation.

25. Many of the actual changes taking place in the family institution originated in the political sphere, particularly in developing countries, where Governments played an important role in providing services and assistance of many kinds. Efficiency of the political system and of government was thus a very important factor in promoting social shange. The question was the extent to which the Government should interfere without encroaching on the vitality of the family institution. For a variety of reasons, that was an area where great caution was needed in view of the possibilities of abridging individual rights and privileges.

26. Where the introduction of legislation—for example, to raise the age of marriage—merely sanctioned existing tendencies or aspirations, particularly within a context in which social conditions were already changing, the legislation could enforce trends and vice versa, permitting an acceleration of change. One view was that, because the family was not an institution that was easily regulated from outside, especially in respect to its internal dynamics, and because cultural and traditional factors were so important to its smooth functioning, it might be questioned whether legislation could be effective if it were in direct opposition to an institution as strong as the family. However, disputed examples were reported where legislation appeared to be instrumental in changing the family institution.

27. A particularly important issue related to the degree of uniformity and standardization that would be imposed by, or, alternatively, the degree of heterogeneity and deviation that would remain permissible under, the modernization of the family. The assumption of increased functions by the State in respect of the socialization of children outside the circle of the family might, in the view of some, produce conflicts between the increasing realization of the potentialities of the individual, on the one hand, and his homogenization across a broad group of important social, economic and cultural values.

II. Demographic, socio-cultural and development factors influencing the family cycle

A. *Demographic factors*

28. Most studies having as their purpose an explanation of the causes and consequences of demographic behaviour had traditionally utilized cross-sectional data and analyses. While such macro-studies had expanded greatly the horizons of knowledge in that sphere, they had proved incapable of furnishing satisfactory answers to many vital questions, particularly questions about demographic change. In respect of fertility change, especially, there was a need to extend research to the level of the individual family where the decision-making process occurred. The family, in its socio-cultural *milieu*, went through different phases and had a variety of experiences to which it adapted or adjusted through responses that influenced fertility, mortality and migration. Analyses of family demographic experiences in those phases and of the responses to those experiences would improve the quality of knowledge about conditions of demographic change, particularly if individual families were related to their socio-cultural *milieu*, permitting the micro- and macro-phenomena to be related at a meaningful level.

29. The concept of the family life cycle had been developed as a framework for studying the different stages through which the family passed from formation to dissolution. Those stages were different for the nuclear and extended types of families. In the nuclear family system, family formation was generally considered to begin with marriage; family-building covered the stage from the birth of the first child to the birth of the last child; a "launching" stage that might overlap with the building stage covered the period during which children left home either to live apart or to marry; and the "empty nest" was the period after the last child left the family of origin. In the nuclear family system, the family might, in some respects, be considered dissolved when one spouse died; or in other respects when the surviving spouse died, if the survivor was considered to continue the existence of the family. Obviously, variations in the cycle were introduced if one of the spouses died at an early stage, before all of the children left the home. As opposed to that pattern, the extended linear family might persist forever, having no beginning or end. Such a family might temporarily become a nuclear family, for example, if both spouses died before their married child who remained with them had any married children of his or her own living in the household.

30. At any given stage of its life cycle, the family was, in fact, at a stage of transition. Each stage was affected or even determined by events of preceding stages. The family learned from its experiences and responded to demographic, economic and social situations on the basis of those experiences over the past and, within limits, in accordance with the prescriptions and constraints of society. In light of that, a longitudinal or cohort approach to the study of demographic events within the family, particularly in respect of reproduction, would afford greater insight into family decision-making and behaviour.

31. Demographic aspects of particular importance in marking different types and stages of the family life cycle as it related to reproductive behaviour were summarized as follows:

(*a*) Age at marriage and the proportions marrying (affected by the sex-age structure of the population);

(*b*) Family-building (through fertility and the preference pattern of the sex of children, infant mortality and the chances of the marriage remaining intact to the end of the woman's reproductive life), including birth spacing, timing of births in the woman's reproductive age cycle and completed family size;

(*c*) Premature dissolution of marriage (through separation or divorce) and widowhood (through adult mortality).

In addition, there were instances in which the family life cycle, as well as the type of family, was affected by migration.

32. The age at which females and males married and the proportions ultimately marrying depended upon cultural and modernization factors, as well as the demographic reality of the sex-age structure of the population and its impact upon the availability of marriage partners. There was ample evidence that, other things being equal, where contraception was not widely practised, age at marriage influenced completed family size. However, where the family was able to regulate fertility

successfully, age at marriage had less impact. The implications of those factors were that, in countries of high fertility, Governments *desiring to induce* couples to have smaller families should institute effective laws raising age at marriage significantly and should facilitate the knowledge and practice of contraception.

33. The sex ratio at different ages was an important factor in nuptiality Men normally married women younger than themselves, and where the population was growing rapidly, the cohorts of girls reaching marriageable age tended to exceed in size the cohorts of males slightly older than themselves That could produce competition among women for marriage partners. *Variations in birth-rate levels from one year to another* might result in later years in imbalances in numbers of potential marriage partners at given points in time

34. Fluctuations in the marriage rate itself might cause later fluctuations in the birth rate. Particularly severe and far-reaching imbalances in the sex ratio, with major effects on the marriage patterns of the population and thus on its reproductive capacity, had resulted from war losses, which fell much more heavily upon males, with the result that large proportions of women never married or became widowed while still of reproductive age. Such losses had had a major effect upon the population structure of some countries Low marriage rates and proportions of women never marrying might also prevail in countries of large-scale labour emigration

35. An important factor affecting family size and structure in many countries was the preference of parents with regard to the sex of their children A strong desire to have at least one child of a particular sex, or at least one child of each sex, was a factor likely to raise the number of children in a family Surveys had suggested that, in some societies, the desire for a son might be so strong that a woman might permit her husband to marry a second wife, or to adopt a son, in order to achieve that goal Although in many developing societies, sons were preferred to daughters, none the less daughters were also desired because of their importance in undertaking household duties or as productive members where the family was a productive economic unit. In the United States of America, one of the countries having data on sex preferences, couples were found to desire a balanced sex ratio of their own children; and if they desired an odd number of children, the proportions desiring more sons than daughters or more daughters than sons were nearly equal

36. Results of pertinent studies suggested that, even if a [illegible] a daughter etc. In many developing societies, where there appeared to be a high preference for sons, the effect on the [illegible] and girls at different times

37. Large-scale migration to the cities had often led to the increasing nuclearization of families. However, instances were [illegible] and thereby transform the receiving household into an extended family If married men migrated to the towns, their wives and children left behind in the rural areas might become dependent upon an extended family for their support Thus, the effect could be in either direction depending upon the particular circumstances Often, the wife and children left behind continued as an incomplete family on a relatively permanent basis As previously mentioned, patterns of migration which were selective of unmarried males in the young, working ages might result in severe imbalances of the sex ratio both in areas of immigration and emigration, and influence the proportion of persons able to find marriage partners. The situation sometimes arose in the rural areas where girls, whose parents feared that they might be deprived of the opportunity to marry because of the out-migration of young men, might marry much older men or—in polygamous societies—might marry men who were already married, with a consequent effect on fertility. In those situations, girls might experience pressure to marry early and produce children as soon as possible in order to ensure inheritance rights

38 The large-scale emigration of males in search of employment opportunities could have adverse effects upon the family structure, frequently contributing to its effective dissolution. Even where the family remained relatively intact, the migration had the effect of lowering completed family size by curtailing reproduction The effects were most pronounced in the country of emigration, when wives were unable or even legally prohibited from joining their husbands In those circumstances, a social phenomenon arising in the country of immigration might be the establishment of quasi-family living Those conditions presented policy alternatives for both the sending and the receiving countries Purely seasonal migration might also influence family and reproduction, but its effect would be minimal when, as in some African cultures, the absence of the workers occurred while their wives were already pregnant or lactating.

39 Family size and structure were influenced by both mortality and fertility The relatively high average household size in developing regions as compared with that in the more developed regions appeared to be due more to the higher fertility of the former than to the existence of extended families Fertility decline was known to have been a major factor in the long-term decline of average household size in developed countries While falling infant mortality at first had the same effect as increasing fertility in raising average family size—to the extent that it subsequently led to a fall in fertility—indirectly it caused a decrease in family size The marked decrease in the severity of many infectious diseases, such as tuberculosis, had reduced the risk that a family would lose prematurely its head or the spouse of its head Any change, brought about by a decline in adult mortality, in the chances of a marriage remaining unbroken to the end of the reproductive span affected completed family size However, reduction of mortality due to [illegible] the keeping alive through medical means of people who were *no longer capable of being socially productive, could cause* stresses in family life

40. Place of residence, that is, rural or urban area, had an important effect upon fertility, and influenced family structure in some developing countries, though the effect was most evident where urban and rural occupation and educational levels were differentiated by factors of modernization Reference was made specifically to studies that had found shorter birth intervals among urban than rural families in West Africa, apparently due to the tendency of urban families to disregard sex taboos and shorten the period of breast-feeding which, in the traditional setting, ensured the spacing of births Many urban occupations did not permit mothers to breast-feed their babies. The discarded traditional methods of fertility regulation had not been replaced by other methods, and increases in fertility were said to result.

41. In urban areas of developing countries, a large section of the population belonged to what was called "high-risk" *families While those "high-risk" or disadvantaged* families had higher mortality, it was a question whether they should be expected to have relatively high or low fertility.

42 Much remained to be known of the demographic factors influencing the family cycle, there had been comparatively little work in that area In view of the pressing need for knowledge of the family's demographic experiences and responses, it was imperative that provisions should be made for in-depth micro-

level studies directed especially to explaining reproductive behaviour.

43. There had been attempts to describe the life cycle of the family by using census data to follow cohorts through time. However, the use of cross-sectional data in that way was not easy, and in general, any results achieved had many limitations. Among other things, that was because successive censuses often failed to collect or tabulate comparable data at different points in time and in the required detail. Special surveys offered the simplest, quickest and most practical way of reconstructing life histories of individuals or families, though the ability of people to recall accurately events or their timing limited what could be achieved from retrospective surveys. Prospective surveys offered in theory the best chance of collecting the desired data, but were generally a slow means of amassing evidence and presented problems through the risk of loss of contact with individuals in the survey. Longitudinal studies of vital statistics data, covering, for instance, the important events of marriages, births and deaths, were theoretically of value, but in practice were often limited by the difficulty of linking successive events. Without doubt, it was imperative that the methodological problems standing in the way of longitudinal study should be tackled and solved; it was highly important to develop the analytic techniques needed for that new field of research.

B. *Development factors influencing the family cycle*

44. There were sharp divergencies of view as to the manner in which economic factors operated on the family cycle, though it was agreed that those factors were of major significance. The lack of consensus centred around two main aspects:

(*a*) The degree to which there was comparability between family structures and given levels of economic organization in society;

(*b*) The adequacy of the economists' concepts and techniques to provide micro-economic models of the value systems existing within the family, particularly the adequacy of the costs/benefit analysis of the value of children to the family.

45. It was difficult to imagine a deterministic relationship between family structure and the equilibrium between the supply and demand of labour. Demand of labour depended upon the state of development, technology options, rate of economic growth and income distribution. There were, it was mentioned, different types of pre-modern societies. In some, an increase in output required an elastic labour supply, a situation that would tend to favour high fertility and relatively large family sizes. However, the forces that tended to work in favour of a conjugal or nuclear family appeared to be related to changes in the economic functions of the family (both its production and consumption functions). In some situations, it was claimed, the long-term interest of the State might be best served by preventing the emergence of a surplus of young people and the impact that that had on the labour market, and hence to seek to reduce fertility. Those long-term goals were the more justified when economic growth and social development were accelerated through specific policy measures initiated by Governments.

46. Relationships between social change and changes in economic function were somewhat obscure, and caution should be used in ascribing the former to the latter. There was the view that the role of the State in modifying the existing social structure was of fundamental importance when the aim was an economic organization of society capable of utilizing modern technology and achieving continuously increasing productivity. However, modification of the social structure inescapably involved, as one significant component, modification of some kind in the function and structure of the family. In the typical developing country, considerable adaptation of family structure would appear to be the consequence of modernization, permitting the degree and kinds of social mobility necessary for the efficient allocation of the labour force within the modernizing economic structure.

47. There were many ways in which Governments intervened to modify family structure and function as well as the interacting roles of family members. The most conspicuous of those ways was the assumption of a very important part in the socialization of children through the establishment of formal public institutions of education.

48. The question of governmental intervention and control of family life was a matter for serious consideration. A clear distinction was needed between the actions of Governments with regard to the regulation of the production of goods and services and attempts to regulate family life and, in particular, reproduction. The rights and obligations of Governments to act with regard to the former were broader and more acceptable than was the case with such a process as reproduction, which was in many ways personal and which involved human rights.

49. The idea that development began with the intention to create a new political system was difficult to accept. In part, it was a question of how development was initiated: by *élite* groups, or by forces of urbanization and industrialization working more widely through society. It was also necessary to consider whether the State should, or in practice did, regulate family structure. Many and diverse forms of family institutions had not only survived industrialization but, it was claimed, were actually functional for economic development. Particular patterns of inheritance, for example, might have fostered early industrialization in certain regions.

50. There was the view, too, that the development process unavoidably created stratification of society, and that when there was an insufficient rate of economic growth, social imbalances became more acute. The result was a society structure based on the cultural heterogeneity of the component elements. Two main processes that deeply affected family life could be identified. Market expansion induced mobility among the groups that participated in the growth in economic activity and hence consumption; it also led to the political mobilization of those large masses which at first were on the margins of the market economy. Both processes tended to lower reproduction rates and to reinforce secular values which emphasized the need to defer immediate gratification.

51. Micro-economic models of the family were being used to describe the determinants of fertility, but attempts made so far should be regarded as exploratory. Some economists, who had abandoned macro-economic models of reproduction and entered a field called the new home economics, were endeavouring to construct micro-models which were potentially interdisciplinary and which were designed to take into account psychological and sociological variables as well as the traditionally economic variables. It was required also that those models should differentiate between different stages of development and, perhaps, even different courses or strategies of development. Psychologically oriented studies had been or were being made that attempted to itemize and classify the demand for children from the points of view of the wide range of benefits they gave to parents, as well as the costs they imposed on parents. Those dimensions would have to be incorporated into micro-models. It was maintained, and generally accepted, that economists should be encouraged to continue in their attempts to relate fertility behaviour to models of economic behaviour at the micro-level.

52. However, the concept of micro-economic models was criticized on various grounds. For example, it was impossible in principle to formulate a model of the reproduction transition that would be valid both for the developing countries and for the developed countries during the period of their transition, the situations being so different. The applicability of economic micro-models even to developed countries in their current circumstances could be challenged. Thus, the introduction of the variables, "tastes", as a component of the demand for children was inadequate compensation for the rich psychological dimension of reproductive behaviour. The complexity of the motivations involved in the family network and its functioning

dictated an integration of social, psychological and economic theory. In addition, most models did not allow for the time [illegible]

53. The question of the employment of women outside the home arose in connexion with economic factors in the family cycle. That question was of particular importance, as employment of women in the modern sector of the economy bore directly upon factors of childbearing, whether it be age at marriage and the commencement of childbearing, number of children born, or spacing of children As family members whose traditional role had been restricted to the domestic production unit, successful actions by Governments to draw women out [illegible]

question arose as to how women might be involved in economic activities outside the domestic production unit in countries where employment opportunities were insufficient even for the male population alone. It was suggested that success in that aspect was more likely in countries where Governments took more active roles in the planning and organization of integrated programmes for economic and social development

54 While the importance of women assuming roles in the economy outside the family was not denied as a longer run proposition, one view held that the time lags were such that economic development, the education of women and the effects of communication of new values through the mass media might affect not the first generation to encounter them but the second, in so far as their wish for children and their reproductive behaviour were concerned.

C. *Socio-cultural factors influencing the family cycle*

55. Culture influenced the demographic processes, viewed in terms of the family cycle, through the ways in which it prescribed norms with respect to marriage and sexual union and to the bearing and rearing of children Further it stipulated [illegible]

prescribed.

56. But those prescriptions influencing family behaviour should be viewed as norms or ideals rather than as purely deterministic rules. There was, in fact, greater or lesser rigidity or flexibility in the manner in which different cultures allowed variations or deviations from the prescribed norms, and within the same culture there was variation among different norms. Cultural norms for any specific element of behaviour were powerful because they were reinforced by numerous other aspects of the culture.

57. As stated earlier, the age of women at first marriage (or entrance into other types of sexual union) would have a significant influence upon their completed family size if contraception were not practised In a monogamous society, other relevant things being equal, early marriage would increase exposure to risks of pregnancy It was not well documented whether the fertility of women living in polygynous marriages differed systematically from that of those living in monogamous unions However, the difference in age between the husband and, in particular, the second wife was necessarily larger than in monogamous marriages That increased the risk that those wives would become widowed before the end of their reproductive life span and was thereby likely to decrease rather than increase the number of children born to women in polygynous marriages Exposure of the wives to the risk of pregnancy was also reduced merely by the added number of wives Family size also could vary with the degree of stability of marital or other sexual union. Culture was one of the principal factors that determined whether a marriage would be monogamous or polygamous, and whether and in what circumstances widows could remarry and the relative stability of marital and other sexual unions

58 Cultural factors also shaped preference for children of one sex or the other; and because those preferences influenced the treatment of the children in certain societies, there were corresponding sex differentials in infant and childhood morbidity and mortality Mortality and its effect in dissolving families could also be influenced in some cultures by practices relating to the treatment of mothers after childbirth. Cultural patterns further intervened as part of the dynamics of the family through prescriptions for care of the aged and the amount of authority which the older members exercised over their descendants Practices and sanctions in respect of divorce or other separations were of particular relevance to reproduction

59 The rapidity with which change in those cultural factors bearing on population dynamics could occur, or how the processes could be accelerated, were important questions There were interrelations between demographic, economic, social and cultural change, and the quality of life of the population was both a goal of development and the human elements in development; thus, unless there was social and economic advancement, there was not likely to be cultural and demographic transformation.

60 Much interest attached to the degree to which change might be precipitated by improving the status of women and promoting their education as a major objective of government policy The fact that women in some countries had attained a measure of emancipation in advance of general changes in the economy and society could be used to support the view that leadership could initiate desired cultural change

61. A counter position was that changes were precipitated by forces external to the society through an alteration of its economic base and were, therefore, not a part of a natural process At any rate, evidence of a direct relationship between the legal status of women and their fertility was lacking It was the complex of factors associated with women's status in any society that was related to fertility

62 In terms of direct effects, factors that tended to be part of the transition process to lower fertility included delayed age at marriage, increased literacy, employment opportunities outside the family and participation in family decision-making. There were less obvious ways, also, by which the status of women affected the entire system of the family in such a way as to influence fertility: for example, educational and cultural factors influenced infant and childhood mortality, which in turn bore upon fertility, and extended education might delay age at marriage

63. Although much stress had been placed upon education as a means of improving the status of women, it could be argued persuasively that that was only likely to occur, and in particular to affect reproduction, within a wider context of economic, social and cultural development. According to one position, rapid change in the position and role of women had only taken place in the context of revolutionary change in the structure of society.

64 Improvements in the status of women could, in one view, have unforeseen side-effects, as in the increased participation of women in the labour force In a context of Western society, an example was given in which the cost of social

welfare benefits, when constituting a direct labour charge to the employer, thereby raised the unit cost of female labour. That tended to reduce the demand for female labour, or to keep women in the lower ranks of the labour force, and to act against their assuming a full role in society. However, that effect could be avoided if the community, rather than the individual employer, were to bear the costs of family support.

65. In many societies, cultural norms were such that alteration of the role and function of women would necessitate an alteration of the social-cultural structure. It was therefore necessary to recognize that women have many roles and functions in the family and in society, and that they should be given assistance in fulfilling those roles and given effective choice in respect of the roles open to them. In that connexion, it was held that elevation of the status of women was without doubt important; but of equal importance was the improvement of the rights of all disadvantaged sectors of the community, as deprived groups usually had certain common problems.

66. One view held that an insensitive emphasis on mere quantification in the analysis of social problems could be seen as a process of the depersonalization of men, which was the cause of profound social unrest and led to a resistance and hostility to modernization itself. It was essential to have positive goals for improving the lot of mankind, with which individuals could identify themselves.

67. In certain cultures, motivation for modernization was selective. For instance, a zest for education had been observed to co-exist with a negative reaction to family planning. Obviously, in such cultures, the elements of modernization that were in the long run essential to a change of attitudes, values and desires with respect to children had not led to results in the first generation to experience them in the way a simplistic theory of cause and effect would have suggested. It was necessary to give impetus to desired social change by marshalling the forces of communication so that people could understand and thereby actively participate in bringing about social change.

68. Over the past decade and a half, a number of Governments had attempted to promote changes among their populations in the practice of contraception. However, the accomplishments had been limited by many factors, including insufficient knowledge as to the key elements that operated for change within a given culture, the forces that bound society together or determined the stresses in it, and, in general, the way society changed. Problems of data and methodology had hampered the evaluation of programme effect, in spite of sophisticated efforts to use inadequate data to the greatest effect. It was essential to build evaluation procedures into any programme from the beginning; only that would lead to clear definition of goals, the monitoring of progress towards that goal and awareness of the appropriateness of particular methods and means. It was also very important that biomedical research on the methodology of contraception should proceed, so that further options might be made available to couples.

69. None the less, much change had taken place: proportions of contraceptive users had increased in some countries from 5 to 30 per cent over the comparatively short period of less than 10 years. It had been found that in some circumstances change could be generated and that the level of programme achievement was related to input or the strength of the programme. High achievement, however, appeared to be associated with high socio-economic status. Among the developing countries with family planning programmes, there was considerable variation in achievement, some of which was accounted for by economic factors.

70. In all of those aspects, it was generally implicit that no culture presented a picture of uniformity of behaviour of the family and individuals, in part because norms changed and in part because certain deviations from norms might be permitted. It was observed that changes in cultural norms might have many dimensions. They might become more or less binding, a critical factor for population change, especially fertility. Where marriage was defined mainly in terms of childbearing, for example, introduction of a national family planning programme would tend to make the marriage norms less restrictive and reduce fertility. In that connexion it was mentioned that among the constraints to achieving the demographic transition had been the failure of countries to seek to promote social change as a component of economic development.

71. There was the question to what extent culture influenced the acceptability of different contraceptives. In practice, the choices available under family planning programmes were often dependent upon the medical profession, which tended to favour contraceptive methods that were under its direct control. In that connexion, the possibility of achieving cultural change should be viewed in terms of those special interest groups in societies which would be affected by a change in the culture. Although biomedical research and technological advance had yielded new means for family planning, the view was that there had actually been a narrowing of the range of effective choice. The constricted range of means in health-related services in some countries was attributed to the influence of medical staffs. Accordingly, there was insufficient recognition of the continuing assets of the condom, either alone or in combination with other methods. The condom had tended to be downgraded consistently and often it was not recommended even in cases where its use would be very appropriate, such as in the case of intermittent sexual activity. The experience of countries that had reduced their birth rates with the aid of condoms and other non-pill, non-medical methods (aside from abortion) was too often overlooked.

72. Because not all family planning methods were of equal acceptability, it was important that individuals should be presented with a wide variety of choices. A broadening of alternatives would make possible a continuity between traditional and modern methods. There were some family planning programmes in which there was freedom of choice among all means of family limitation, consistent with the values of the culture. Moreover, there were important benefits to be derived from that procedure whereby all non-medical methods, including condoms, were made available through normal distribution channels, particularly in the rural areas where health and medical services were limited or missing.

73. In the formulation of population policy, the family should be recognized as the intermediary between policies and the reproductive process. Social change affected family functions; a problem for research was how the change in family function produced demographic effects.

74. It was considered abhorrent to human values to withhold from any sector of society the information and services which were needed for the regulation of fertility. Social justice meant that the benefits to individuals and the family of being able to achieve goals with respect to the number and spacing of children should not be restricted to the more fortunate members of society. On the other hand, social justice also required rejection of the "malthusian" idea of limiting the number of children only among the poor.

75. Socio-cultural factors were multifaceted. In most traditional communities, religion was a crucial factor in determining the attitudes of its members. In fact, religion could be seen as the reflection of the culture. Probably equally so in modernized communities, considerations of religion still loomed large even in issues that depended on the personal judgement of the individuals. Until the current time, the issue of the means of birth control, if not the ends, had remained controversial in some religious groups, and could influence the success of family planning programmes.

76. No matter how rigid the norms, cultural patterns were capable of change. All known societies had experienced, in lesser or greater degree, at least among some of their members, changes in family behaviour patterns under the influence of changing socio-economic conditions and exposure to new ideologies. In any attempt to encourage and orient change in family life within any specific society, an understanding was needed of the existing cultural norms, their relative rigidity or flexibil-

ity, the changes that were already taking place, the factors influencing those changes and their direction; that understanding was essential for working out realistic and effective policies.

77. Most Governments of developing countries sought major economic and social changes as indicated by the preparation of development plans. It might be said that, to the extent that those plans were being realized, social and cultural change was generated which affected the family. Thus, in a number of countries, the family was experiencing appreciable change as a result of development.

III. Relationship of urbanization and internal migration to family life and structure

78. It had been observed earlier that urbanization and industrialization were aspects of the process of modernization in which the institution of the family underwent modifications which had important implications for population change. Internal migration, as the chief mechanism for urbanization, was an element in achieving the benefits of modernization.

79. There were also the negative or dysfunctional aspects of internal migration and urbanization, as evidenced by the effects of the different types of migration on family life. With a few exceptions—generally centrally planned economies—the massive internal migration characteristic of urbanization in most developing countries had been a spontaneous migration of individuals rather than a planned and co-ordinated process. As had been the case in the process of industrialization in the nineteenth century *in the currently developed countries, when* there had been much suffering associated with the growth of urban centres, that spontaneous internal migration was largely a *laissez-faire* process in which the individual migrant was left to his own resources in finding his place in the town or city of destination. In some instances, however, chain migration had provided an exception to this general picture by channelling newcomers into a social setting established by earlier migrants. That was the case, for example, where the family head migrated *first and lived with other kin or affinity groups until he* was able to send for his family.

80. The problems of such spontaneous migration were magnified still further because most of those countries suffered *from severe unemployment and underemployment*, in part as a consequence of the introduction of modern labour-saving technology and in part because of their rapid rates of population growth. In such circumstances, the receiving urban centres were unable to absorb more than a fraction of the in-flowing migrants into useful economic activities.

81. Internal migration was seen as having significance for the migrants themselves, for the place of origin and for the place of destination. Despite the absence of statistical data to provide substantiation, the effects on family *life* and *fertility* of large-scale internal migrations occurring in the post-war [illegible] the effects of broken families, and in some cases—it was claimed—higher mortality and morbidity as compared with those who remained behind in the rural places of origin.

82. While families in the rural places of origin often derived economic benefit from the monetary remittances of migratory family members, on the whole emigration was considered a conservative, non-innovating force from the point of view of the rural areas of origin. Migration, it was said, often served as *an escape valve which permitted rural families from* small settlements to avoid, or at least defer, making the changes in their way of life that would be required to keep them in the mainstream of economic and social development. In some countries of Europe, certain areas of continued high emigration had become trapped as exporters *of low grade labour to more* economically advanced areas—a situation which was socially *divisive.*

83. The urban type of education given in rural schools (where those existed), *or in the urban schools to which some* rural parents were able to send their children was said to be a contributing factor to [illegible] areas, since most of those who received such education were dissatisfied later to work in rural occupations. The net effect was thus to [illegible] as centres of unskilled labour and of [illegible].

84. Given the incapacity of the modern urban industrial sector in many countries to absorb any [illegible] a significant proportion of the migrants who came to [illegible] economic [illegible], it was necessary to make a distinction according to the measure of success achieved by different types of migrants to urban centres. Large numbers from the middle classes, but smaller numbers from the lower classes did manage to establish themselves in highly competitive urban [illegible] with prospects for social mobility, which tended to [illegible] a modification of family life [illegible]. Those sectors of the population with [illegible] employment opportunities often sought support from the extended family system or by having many children in the hope that some could eventually make a [illegible] contribution to the family group. It was observed that in such cases many migrants tended to form communities of their own so that they could provide mutual assistance to one another according to need. Those communities often tended to form subcultures which, although urban in residence, were little affected by the modernizing influences of urbanization. Thus the family life of persons living in such conditions retained features that were more strictly rural than urban.

85. Large-scale migration to urban areas also had implications for the problem of the care of the aged which had [illegible] comfortable in a material sense, was potentially isolated from cultural contacts with others. The scale of provision of services to meet that situation presented acute resource problems in developed countries where the small nuclear family was an established fact. In some developing countries, it was regarded as a community function to care for elderly or disabled people rather than a function of the nuclear family as such.

IV. Changes in the family cycle relating to family life and reproductive behaviour

86. A major impediment to the understanding of demographic change, particularly in the area of fertility, was that over the past, relatively little work had been done to improve the perception of demographic situations from the micro-level of the individual family. A valuable demonstration of the importance of the micro-analytic approach to understanding demographic and social phenomena was represented by a set *of models, which illustrated important aspects of family life* [illegible] situations. The illustrations [illegible] graphic transition [illegible] mortality and high [illegible] and high fertility; [illegible] and low fertility. In the models a monogamous marriage system was assumed in which all women married at age 20 and all men at age 25. Model life tables and schedules of fertility rates by marriage *duration were selected which appeared to correspond fairly* [illegible] *of the developed countries.*

87. A number of measures of interest for demographic analysis of the family had been derived from those models

including the probabilities of marriage dissolution by the death of one spouse, expected years of parent-child and sibling relationships within the family, the proportion of marriages surviving to the end of the fertile period, the length of family life, the incidence of orphanhood, mean family size, family dependency ratios and the like.

88. It was agreed that the models were a valuable first step towards quantified measures of the stages in the family life cycle on a multidimensional basis (rather than the mere traditional analysis of events in the life of a given individual). They represented an extension of the classic techniques of demography into wider fields relevant to broad social issues and were a valuable, useful tool for studying the micro-demography of the family. However, the models referred only to the strictly nuclear family, while it was well known—and of considerable importance in demographic behaviour—that even in societies where the nuclear family was the dominant form, additional persons were very often included in a family. That model also could not account for fissions and fusions in families and it was possible to propose more than one assumption for some variables, with different results. However, those qualifications did not detract from the usefulness of the model.

89. The applicability of the high-mortality assumption to all of human history was questioned. There had been occasional instances of very high rates of population growth before modern health measures became available. Life tables based on paleo-demographic evidence and the rarity in small-scale societies of infectious diseases relying solely on a human host were cited in support of the view that life expectancy closer to 40 than to 25 years might have been common before urbanization. Doubt was expressed, however, that a crude birth rate of 25 per 1,000—to correspond to a life expectancy at birth as low as 40 years and the very slow rate of long-term population growth—could possibly have been general during those times.

90. An important finding through use of the models was the existence of a marked discrepancy between the image of the effect of rapid population growth (the disequilibrium situation), as viewed from the macro-level of society as a whole, and from the micro-level of how an individual perceived what was occurring within his own family situation. According to the models, the rapid population growth of the disequilibrium conditions yielded child-adult ratios in the family only slightly higher than the high equilibrium conditions. In those developing countries where additional land and employment were available, support of children did not necessarily impose major stresses on the economy of the individual family. However, fulfilment of responsibilities for children at their maturity, including provisions leading to fragmentation of land and other resources at inheritance, would present difficulties if the macro-demographic developments were producing insufficient employment opportunities and inadequate incomes for the increasing numbers in the maturing cohorts. In the conditions of disequilibrium, the swiftly increasing total numbers of people, the rapidly growing numbers of families and the age structure of the total population would have serious consequences for economic development, employment, housing, education etc.

91. But the dependency burden changed during the life cycle of the family, being light for a short time in the early married life of a couple, then rapidly becoming heavy, then decreasing gradually over a long period. Thus, to meet demands at each stage, each family would need to borrow resources from the future to overcome the early unfavourable period, to repay later when the burden became lighter, as the children entered the labour force one by one. In practice, however, there was often no way to redistribute resources over the life cycle of the family, and at some stages it must carry its burdens without adequate resources to maintain its standards at any given level.

92. Another finding of importance was that it was in the period of demographic disequilibrium that families in certain cultures were most likely to achieve desired family structures. For example, the probability of having a son who survived to marriage age was greatly increased under conditions of demographic disequilibrium. The proportion of marriages failing to produce a male heir as thus defined was only 21 per cent under conditions of the disequilibrium model, that is, low mortality and high fertility, compared with 41 per cent in the high-equilibrium model. Thus, the coincidence of low mortality and high fertility permitted most families to achieve a surviving male heir and hence the economic security and generation continuity that was so important to them. In the model, and in the analysed experience of many countries, a closer accord between the demographic reality and the cultural ideal was achieved at unchanged levels of fertility. The high proportion of families with surviving sons was a product of reduced mortality rather than a strategy of fertility. In fact, the prevalence of sons might reinforce the ideals that sustained high fertility. In the circumstances, the conventional arguments for the acceptance of family planning on the basis of the disadvantages of large families might not be persuasive, and declining mortality might not represent an inducement to lower fertility. The fact was that in some contemporary cultures, the deep desire for two or more sons was a major deterrent to the acceptance of the small family ideal that some Governments might seek to inculcate through educational activities and family planning programmes.

93. Through analysis of family-cycle dynamics, by use of the models, conditions of widowhood and young adulthood were seen to vary with the conditions of demographic equilibrium or disequilibrium, though, in some societies, cultural factors intervened to ameliorate or modify experiences in those groups.

94. For widowhood, it was found that under each mortality-fertility assumption, the average duration of widowhood was 12 years, but that figure referred to widowhood after a first marriage and disregarded the possibility of remarriage. Other findings, such as the age at which widowhood occurred, the number of widows in comparison to the number of widowers and the supply of unmarried girls on the marriage market, would affect the chances of remarriage and the opportunity of resuming childbearing. Moreover, certain socio-cultural factors, such as the existence of polygyny and the levirate system, would have an important bearing on remarriage: in parts of the world, the problem of widowhood scarcely existed, since kinship systems specified who would assume responsibility for a newly widowed woman. The findings of the models nevertheless suggested that attention should be given to the fate of widows in different societies. Where their number as revealed in censuses and surveys was suspiciously small, neglect and other discriminatory practices might exist, which would lead to increased mortality.

95. The status of young adults in the society, and particularly of girls between the ages of 15 and 20, was considered to be of crucial importance. Whether a girl moved directly from the bonds of her family of orientation to those of her family of procreation, or had some period of relative freedom from family influences when she would be better able to function as an individual, was considered to be of potentially tremendous importance in determining her future fertility behaviour. In fact, opportunities available to both sexes for participation in society at the adolescent stage had potential for influencing future reproductive behaviour. In that connexion, it was necessary to examine prevailing patterns of age at marriage. Marriage was contracted, often at the age of biological maturity, if the young couple could be integrated into the economy of an extended family. If the nuclear family prevailed, marriage was more likely to take place only when the couple had reached economic maturity. In modern Western society, a pattern of entering marriage at an age of psychological maturity was apparently becoming prevalent.

96. The timing of births during the woman's reproductive years influenced both family structure and relationships among family members. For example, in certain societies, women were strongly motivated to continue childbearing as long as

the first child and positively correlated with her age at the last birth.

97. Relationships between family members were seen to be influenced by intervals between births Short birth intervals produced families in which the ages of children were close together and which were consequently more coherent, self-centred and bound together. But whether a family was "closely knit" would depend not only upon the relationships among the siblings, but also upon that between husband and wife and between parents and children Where fertility was high, short birth intervals might be associated with a less companionate relationship between husband and wife, indeed, the status of the woman in the family unit might be inferior.

98 In individual families, decisions and behaviour with respect to childbearing might be influenced by the provisions that the State and society made for the aged. Thus, in the absence of social security schemes for assistance to the aged, young couples attempted to provide for themselves in later years through the bearing of children, who were supposed to care for their parents when they became too old to work. With the effective introduction of old-age pensions, that element in motivation for large families disappeared Since most developing countries did not possess social security schemes including old-age pensions, from the point of view of the individual family it appeared that the larger the number of sons (if they were the ones who could be expected to support their parents in old age), the greater the expectations that they would be adequately cared for when the time came

99. With regard to other vulnerable groups (the blind, the mentally and physically handicapped etc) the situation was somewhat similar· in developing countries, the State was seldom in the position to afford the required aid, and either private agencies or the family must care for those in need. Again, from the point of view of the individual family, such a burden was less felt in a small than in a large family. The policy implications were clear in respect of the aged and other indigent groups improvements in State assistance would remove the probability of experiencing such adversity as a reason for seeking security by having large numbers of offspring

100 In conditions of economic and social development, where traditional and modern solutions to problems within the family coexisted, the current generation of adults assumed two heavy responsibilities that of supporting their own parents (and perhaps other indigent kin); and that of providing their children with the amenities offered in the emerging conditions of modernization. In traditional societies, the primary obligation was that of the children to their parents, that was a motivation to have many children It could be argued that, in modern societies, the primary obligation was that of parents to children, a factor in the motivation to have fewer children. In societies undergoing transition, the adult of today might thus be paying two debts in the parent-child obligation scheme, but would not derive a direct benefit from either.

101. In summary, as the family moved through time and experienced successive cycles—formation, development of family-building and dissolution—it accumulated experiences and adopted response patterns that were not easily discernible from aggregate population behaviour. Failure to recognize that was reflected in the lack of success with some family planning programmes Many gaps in knowledge remained, particularly where the extended family was concerned and to which analytical techniques of the type referred to above had not been applied.

V. Population and other public policies for the family: benefits and liabilities

102 The diversity of cultures and the great differences among countries with respect to development needs were such that particular policies that might be suggested in an international setting could not be equally applicable in all parts of the world. Thus, the Symposium attempted to set forth some general principles upon which policies relating to population and the family might be based, rather than to offer specific recommendations It was more appropriate to outline alternative measures or policies from which Governments might select those suited for their needs.

103 In that connexion, a basic principle was that, in formulating policies relative to population and the family, there should be due regard for the rights and dignity of the family and the individual, as well as for national sovereignty That principle had been established in General Assembly resolutions 2211 (XXI) and 2542 (XXIV), and at the International Conference of Human Rights and in its Proclamation of Teheran [2]

104 The modern State was therefore bound by certain basic rights of the individual, such as the right to marry, the right to determine the number and spacing of children, the right to divorce and the right to migrate within the country While those rights had to be recognized in all circumstances, the individual should exercise the rights responsibly It was mentioned that governmental commissions in Sweden in the 1930s and recently in the United States of America had taken essentially similar views about the objectives and means of population policies, even though their demographic concerns were completely different Sweden would have preferred a higher birth rate, and the United States a lower one That convergence of policy was offered as an example of the fact that there were political restraints on all demographic policy options and that the outcome, whatever the starting-point, was usually that the freedom of individual choice should be maximized.

105 In the field of social policy, States were seen as having an obligation to provide protection for all groups in society, such as minorities, women and children Such measures as family allowances and grants for children, for example, were justified by the principle that children should have as nearly equal a start in life as possible; whether the effects, if any, of such enactments were congruent or inconsistent with population policy should not influence decisions to grant such allowances.

106 It was emphasized, therefore, that family policy and population policy *per se* should not be equated The main purpose of family policy was to assist families in achieving their individual goals, rather than to bring about a change in the rate of population growth Family policy was a broad design for the well-being of the family, and there was a whole complex of measures that could be taken to influence its formation,

different governmental agencies.

107. An important consideration in adopting policies and implementing measures was that the institution of the family was the primary intermediate factor between, on the one hand,

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[2] *Final Act of the International Conference on Human Rights, Teheran, April-May 1968* (United Nations publication, Sales No E.68.XIV.2), pp. 2-5.

108. To achieve any desired change in the aggregate birth rate and in population growth, it was thus necessary that the family should realize that its own long-term interests were involved, and such efforts would only be successful to the extent that families accepted and understood changes as aids to development and the enhancement of the quality of human life. There were means to which no controversy was attached and whereby Governments might accomplish that goal, including education and investments in communication. However, legislation might be required as a catalyst for change. Conservative policies or approaches should not be adopted or maintained merely under the pretext of preserving culture.

109. Measures that might promote the betterment of society were not always compatible with the well-being of individual families. Consequently, flexibility was needed in the application of measures, and, where indicated, provision should be made for special requirements for individual families. Restrictive or coercive policies and measures were unlikely to succeed: they merely provoked hostility. The goal should be rather to devise policies that increased options and to relieve individuals and families of conditions which they perceived as being oppressive.

110. Policies to improve the welfare of the family embraced a wide range of provisions, including: (*a*) measures to facilitate marriage and the setting-up of independent domestic units; (*b*) economic measures geared to the elimination of disparities in the basic living conditions of family members irrespective of the size of the family to which they belonged; (*c*) implementation of health protection during pregnancy, childbearing and infancy; (*d*) measures to protect the primary rights of the couple to determine the number and the timing of the children; (*e*) facilitation without restrictions and discrimination, of the easy access to complete and efficient information on techniques for regulating fertility, and to the techniques themselves; and (*f*) the promotion of education for responsible parenthood.

111. Relatively few countries had articulated a population policy, though it was increasingly recognized that rates and patterns of population growth had important implications for human well-being. In that connexion, attention was drawn to the Declaration of Population Strategy for Development adopted by Governments in the ECAFE region at the Second Asian Population Conference at Tokyo, on 13 November 1972. That declaration, while stating broad goals in terms of improving the general welfare of the people of Asia, included the specific goal of extending the small family ideal and making available the means of achieving that ideal with ease and dignity. It was stated that the achievement of the small family ideal was a population policy goal also in a number of countries outside of the Asian region, particularly in the Caribbean, Central America and Northern Africa.

112. There were a variety of means by which Governments might implement their objectives of achieving lower rates of population growth, frequently expressed as the achievement of smaller completed families. Appropriate measures for developing countries included raising the legal age at marriage, provision of family planning service and information, providing for compulsory education, family allowances, care of the aged, legislation against child labour and the promotion of youth programmes.

113. Raising age at marriage had been widely promoted as a measure to achieve smaller completed family size where family planning was not widely practised. Some doubt was raised, however, as to the effectiveness of provisions raising age at marriage, as there were often no means of enforcing such laws, and successful enforcement depended on the co-operation of many individuals and institutions. To achieve the desired effect, the passing of the appropriate law would have to be accompanied by efforts to ensure co-operation. It was also mentioned that if laws raising the legal age at marriage were to be effective, certain parallel action would be required in other spheres, for example, to provide youth with additional educational opportunities and recreational activities, which were seriously deficient or lacking, particularly in rural areas. While age at marriage was evidently important in that context, in many countries where marriage was virtually universal and *de facto* obligatory, a useful demographic as well as humanitarian government policy would be one of ensuring individuals the freedom not to marry. On the other hand, where Governments desired to support a higher birth rate, action might be taken to facilitate marriage under the most favourable circumstances.

114. Compulsory education for children at the parents' personal expense was mentioned as a means of making children less valued by raising their "costs". There were objections, however, as parents in developing countries would be unable to bear the expense.

115. Having many children to ensure the survival of some through one's lifetime as a means of security in old age was still evident in many regions. Old-age pensions and other forms of social security would help to remove the burden of old age from the family and would lower the value of children. Such measures would constitute a heavy financial obligation for the poorer, developing countries. However, some of these costs could be discounted against the economic disadvantages of an excessively high proportion of children in the population.

116. Legislation against child labour would also increase the cost and lower the value of children. Promotion of youth programmes would be designed to open horizons for young people to develop loyalties to society as a whole. For girls, such programmes could provide the break between the family of orientation and the family of procreation, which had been mentioned earlier as having an important influence upon later reproductive behaviour.

117. The national family planning programme had been the most widely heralded measure for achieving lower fertility. There was no doubt that the programme had many advantages, in that it provided service to those who desired it and informed individuals and couples lacking such knowledge of the possibilities and advantages of spacing and limiting births. That effectiveness varied could be attributed to many factors, specifically including a lack of understanding of the conditions of fertility change, especially at the micro-level. Improved development indicators, particularly health service, would also bring about greater acceptance of government family planning programmes. With respect to the latter, it was held that there was a need to extend the service to all disadvantaged groups, as those groups were frequently not reached by existing schemes.

118. Much importance was attached to the potential impact on population and the family of measures designed to raise the status of women. In that connexion, a number of proposals contained in the report of the Regional Seminar on the Status of Women and Family Planning, held in Jakarta, Indonesia, from 20 to 30 June 1973, were mentioned as deserving the endorsement of the Symposium. Attention was also drawn to results of the Regional Seminar on the Status of Women and Family Planning for countries of the western Hemisphere, convened at Santo Domingo, Dominican Republic, from 9 to 22 May 1973. Of particular merit were the extension of education opportunities to women to enable them to play a more active role in national life and the promotion of gainful employment opportunities for women outside of the home. Other measures proposed by those seminars to which the Symposium subscribed were, in particular, the following: improvements in maternal and child health as an aid, *inter alia*, to reducing fertility; incorporation in school curricula of courses on population dynamics and family life; and the utilization of the mass media for the dissemination of information on family planning.

119. Rapid population growth in the developing countries meant that attention was focused on the need to reduce the birth rate, but, at the same time, there were other countries where natural increase was low and whose Governments sought to increase the birth rate. It was not the number of people alone that was important, but numbers in relation to resources. The goal should be to ensure a better life for all people by

portant.

120. In most developing countries, the bulk of the popu-

general, to elevate the rural community Where sparse population hampered development, resettlement programmes might be *undertaken to ensure the best utilization of facilities* and services.

121. It was not possible systematically and comprehensively to take account of the great variety of measures considered to influence the family processes. Some measures adopted as social or economic policy had a demographic impact through their influence on family decision-making relating to reproduction, other measures designed explicitly to influence fertility, such as child allowances and laws governing contraceptives, in some cases appeared to have little effect. That was an area in which research was needed to determine whether, how and why measures specifically affected or did not affect reproduction

122. Policy-makers should take account of the effect of implicit or indirect policies, for those policies might cancel the benefits to be derived from measures designed to influence family life and decision-making Because policies sometimes produced unforeseen and unwanted effects, it was important that they should be flexible and provision made for their review and modification.

123 An example of a measure that could have an unintended effect was the establishment of day-care centres for small children Those centres were believed by some to have an anti-natalist influence, since the availability of centres enabled mothers to take employment outside of the home But scholars concerned with the new home economics regarded such centres as a pro-natalist influence, since women having access to them might be encouraged to have additional children Another example was an act that was intended to recognize the role of childbearing as a social function, and which provided that working women might remain at home for three years after the birth of a child and receive an allowance from the State While that measure did increase period fertility (though not completed family size), it was found that women with less education and lower occupational status took advantage of the law to a much greater extent than did women in the upper strata A possible consequence, given the decrease in *per capita* income of the families that resulted when the women of lower occupational status had an additional birth, was a further disadvantage for children born to those families The tendencies encouraged by the law might lead to the emergence of a socially disadvantaged group of women. The desirability of attempting to foresee all possible consequences of policies was evident, as was the need for flexibility to permit change when unexpected results developed.

124. An important principle was that whatever population or family policy Governments chose to adopt should be formulated as an integral part of over-all development plans and co-ordinated with other policies in the social and economic fields In this connexion, there was the view that many countries admitted having social and economic development problems but were reluctant to accord independent status to a

prime movers, thereby avoiding an international situation in which the population issue had become a pawn

125. Another important consideration relevant to policy formulation was that the programme to implement policy should have short-term as well as long-term goals; both political and popular support would thereby be more easily marshalled and *utilized effectively In so far as possible*, policies should also have measurable targets and evaluation procedures should be built into their operation from the beginning While there was a need to give attention to the long-term implications of future population trends, there also was a need to provide for the existing population, for example, in the cases of youths and others of working age for whom employment opportunities were lacking

126 Since Governments were required to deal with a wide variety of urgent problems at any one time and might not fully recognize the short-term as well as the long-term importance of the population factor, it was essential to relate population to other aspects of development that were accorded particularly high priority Accordingly, agencies of government dealing, for instance, with housing, employment, health and welfare services should co-ordinate their actions, and the direct and indirect effects on population variables of any action should be the concern of them all

127 There was some support for the view that, in respect of actions that Governments of developing countries with a market economy could adopt in order to modernize the family, the situation in the currently developing countries was vastly different from what had previously occurred in Europe Consequently, it was no longer possible to rely on rapid progress in economic and social development as a solution to population growth problems. However, an opposing position was that in *order to be realistic, one must take as given the current rates* of development in those countries and determine what supplementary measures might be taken to accelerate development, there was wide variation among the developing countries in respect of development status and potential and demographic conditions and prospects, and each should be studied from the standpoint of its individual conditions and options.

VI Conclusions

128 In accordance with the wishes of the Population Commission, the Symposium made no effort to achieve a consensus on the various issues It did not set forth a specific body of conclusions What follows is a summary of the main points on which there was general agreement as being of particular relevance to the role of the family in population change

129 In the respective disciplines, there had been insufficient attention to the role of the family in population change, and that short-coming partially explained what might be regarded as the unsatisfactory state of knowledge about the dynamics of the family cycle and its influence upon reproductive behaviour Modern efforts in many societies to induce a "premature" transition of national fertility from high to low levels and achievements in that area were based upon perceptions of the family both as an adaptive unit and as an agent of change

130 Alterations of family structure and function, stimulated by aspects of *industrialization* and modernization, might be regarded as precursors of a modification of reproductive behaviour Changes in the character of family dynamics, particularly a decline of fertility, were deeply imbedded in the processes of social and economic development. However, certain cultural aspects favourable to lower fertility, such as the improved status of women, could be initiated with appropriate leadership For those and other reasons, development was not necessarily indispensable for some reduction in fertility levels, though it was clear that modernization of the family could take place only in the development context Indeed, to the extent that countries were achieving social and economic development, changes were being generated which tended to modernize the family.

131. Internal migration and urbanization were aspects of modernization that altered family function, as well as its

structure, though not necessarily in the direction of increased nuclearization, and changed the roles of its members. That evolutionary process involved provisions for the education of children, the extension of employment opportunities for women outside the home, provisions for the care of the aged and disabled, rights and responsibilities of youth and even the stability of the family itself.

132. While modernization was normally associated with lower fertility, it could in certain circumstances cause fertility to increase, at least temporarily. Such was the case in certain African countries, where internal migration and urbanization had created a new *milieu*, incompatible with traditional birth-control practices, and modern methods had not replaced them.

133. The basis of population policy and family policy and the methods used to implement them were frequently very similar. However, family policy was intended to ensure the well-being of the family and not to bring about changes in rates of national population growth. Where a conflict existed, a humanitarian policy should prevail: there should be due regard for national sovereignty, but also respect for the rights and privileges of individuals and the family. Policies should, therefore, not be coercive, but should provide options from which individuals and families might choose.

134. Within the frame of national sovereignty and human rights were broad areas susceptible to policy and to which there could hardly be any objections. Policy action in those areas might have both quantitative and qualitative implications for the family and for population dynamics. Countries and peoples everywhere might subscribe to changes in those areas, for they involved at a fundamental level the elevation of the human condition. Examples were improved conditions of health, equality of the sexes, provisions to ensure freedom to determine the number and spacing of children, universal literacy and so on. Frequently, legislation might be required as a catalyst for change.

135. While the main population policy concern of most developing countries was an excessive rate of national population growth, there were countries in which the number of inhabitants was considered to be too small and higher fertility was favoured as a matter of policy. It was of special relevance that numbers were important not in themselves, but in relation to resources, and that rates of population growth were essential facts only within the development context. In either case, the main concern was the improvement of conditions of life, which should be a guiding principle in the formulation and implementation of policy.

136. Lack of success in including changes in fertility behaviour was due in part to cultural tenacity and to the fact that culture prescribed behaviour in every aspect of family life governing fertility and maintained other institutions to support its prescriptions. Thus, it was essential to recognize the family as the intermediary between policies and the reproductive process. Accomplishments of organized family planning programmes, measures relating to contraception and other means of birth control, allowance schemes and other provisions depended in a large measure upon decisions and actions within the family.

137. The individual did not, however, perceive the effect of such conditions as rapid population growth upon his own family situation in the same way that those conditions might be seen to influence society as a whole. That discrepancy in perception at the micro- and macro-levels might have accounted for some of the failure of individual families to behave in such a way as to support what might be regarded as the common good and might explain the modest to poor achievements of programmes intended to reduce fertility. In order to overcome that discrepancy in perception at the micro- and at the macro-level, it would be necessary for the family to realize that its own long-term interests were involved. Such efforts would be successful only to the extent that families accepted and understood changes as aids to development and the enhancement of the quality of human life.

VII. Implications for research

138. There was wide agreement that the formulation of the objectives of population policies and for finding proper and effective means for achieving those objectives required a sound scientific basis. The contribution of research in the social sciences was seen as essential, even if limited, to formulating national policy.

139. Governments frequently lacked the factual bases for establishing rational policies concerning population and family relationships. The importance of research was shown by the KAP surveys, which had dispelled former ideas that people in developing countries were fatalistic about family size. Those surveys had helped to convince officials in a number of countries that people wished to have fewer children. Moreover, it was seen as important for Governments to be as fully aware as possible of the consequences of policies and able to adapt flexibly to situations where the effects of policy in one area were found to undermine or cancel out policy in another area. Efforts were therefore needed to relate research to the evaluation of policy.

140. It was the consensus of participants that macro-analysis of fertility behaviour, which had been the main, traditional approach to the analysis of demographic change, was not able to yield the required understanding of cause and effect in population dynamics. Questions of how change actually occurred remained unanswered, and connexions between the family structure and fertility were obscure. Moreover, interrelationships between family structure and demographic change were not well understood. Those problems required analysis with a multidimensional approach, with the family as the intermediate agent between individual behaviour and society.

141. There was a need to devise new techniques for analysing the demographic process occurring within the family cycle. Investigations of family building and dissolution within the context of the social, economic and cultural aspects of society, that is, a combined micro-macro analysis, would require a methodology that would follow the family through time. While the development of methodology for those purposes was considered to be of the first order of importance, the main agreement was the need for a general redirection of research to in-depth micro-analytical studies. That would give a new thrust in the quest for knowledge about the determinants of population dynamics.

Appendix

AGENDA

1. Opening addresses
2. Election of officers
3. Adoption of the agenda
4. Modernization, population and the family: cultural and historical perspectives
5. Influence of socio-cultural, economic and demographic factors upon the family cycle
   (a) Demographic factors
   (b) Development factors
   (c) Socio-cultural factors
6. Influence of changes in the family cycle upon family life
   (a) Reproductive behaviour
   (b) Aspects of urbanization and internal migration
   (c) Other factors
7. Population and other public policies for the family and society: benefits and liabilities
   (a) Types of policy measures and their influences upon family size, structure and function
   (b) Influence of policies upon population growth and characteristics and other aspects of development
8. Overview of the Symposium
9. Adoption of the report
10. Closing of the meeting

Annex IV

REPORT OF THE SYMPOSIUM ON POPULATION AND HUMAN RIGHTS

Introduction

1. The Symposium on Population and Human Rights was held at Amsterdam from 21 to 29 January 1974 It was the last of a series of four symposia held in preparation for the World Population Conference, 1974, as recommended by the Population Commission at its sixteenth session[1] and endorsed by the Economic and Social Council in its resolution 1672 (LII).

2 The 1974 Conference, as endorsed by the Council in its resolution 1484 (XLVIII), is being organized as a meeting of Government representatives It will differ from the World Population Conference, 1954, held at Rome, and the World Population Conference, 1965, held at Belgrade, which were technical meetings. Therefore, a series of scientific activities were planned in preparation for the World Population Conference, 1974, to identify and clarify critical problem areas at the technical level

3. Among those pre-Conference activities were four symposia on. population and development, population and the family; population, resources and environment; and population and human rights. Those were technical meetings of experts participating in their personal capacity.

4 The Symposium on Population and Human Rights was organized by the Population Division in association with the Division of Human Rights and in collaboration with the Government of the Netherlands. The meeting was made possible through the financial assistance of the United Nations Fund for Population Activities.

5. The agenda adopted by the Symposium is reproduced in the appendix. Twenty-eight experts in various disciplines, invited from the various regions of the world, attended the Symposium in their professional capacity. Several scholars who were invited from developing countries, particularly those from Asia, were unfortunately unable to attend the Symposium.

6. As a basis for the discussions, participants were provided with technical papers specially commissioned for the Symposium and draft background papers prepared for the Conference

7. The Symposium was opened by the Secretary-General of the World Population Conference, 1974, Antonio Carrillo-Flores In his opening statement, he welcomed the participants and expressed the appreciation of the United Nations for the hospitality extended by the Government of the Netherlands Addressing the meeting, he stated that although the determination of human rights relating to population and population policies in such fields as fertility, mortality, internal and international migrations was a complex and difficult task, it was also a very important one He also stated that the conclusions which the Symposium would reach, as well as any differences which might arise, would be of great value to the representatives of Member States at the World Population Conference

8. On behalf of the Government of the Netherlands, the Minister for Development Co-operation, J. D Pronk, welcomed the participants and emphasized the importance that his Government attached to the Symposium as a preparation for the World Population Conference It would be a meeting which would consider the population problem in the context of the promotion and implementation of civil and political as well as economic, social and cultural rights, the realization of which would be guided by the principle of equality, both between and within nations.

9 [illegible] *private law and political rights could not be considered independently of the population problem and the high fertility rate The promotion of equal rights and opportunities, while an objective in itself, was also essential for the success of family planning and the regulation of fertility*

10 The Director of the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, Léon Tabah, emphasized the importance of the technical discussions at the Symposium both for the World Population Conference and the World Population Plan of Action Referring to the major findings of the three previous symposia, he stated that they had shown a convergence of ideas to the effect that the immediate solution to population problems should be sought in fields other than population, without rejecting, however, population policies which were without doubt a factor in shaping the more distant future He said that it would be against this background that this last Symposium prior to the World Population Conference would take up the questions of population and human rights, which affected the destiny of the individual and of society.

11 The Director of the Division of Human Rights of the Office of the Under-Secretary-General for Political and General Assembly Affairs, Marc Schreiber, in his address, underlined [illegible] norms pertinent to the question of human rights and population

12 Léon Tabah served as Director of the Symposium. D. J. van de Kaa, Director of the Netherlands Inter-university Demographic Institute (NIDI), The Hague, was Co-Director. Kathleen M. Jupp, Co-ordinator, World Population Conference and World Population Year, 1974, Population Division, acted as Co-ordinator. J. A. L. Cooray, Advocate of the Supreme Court, Sri Lanka, was appointed General Rapporteur. C. A. van Peursen, Director of the Philosophy Institute, Leiden University, acted as Consultant. Gustavo Perez-Ramirez, Population Division, acted as Technical Secretary. J. van den Boomen, Population Division, and Maxime Tardu, Division of Human Rights, also serviced the meetings.

13. Owing to the nature and scope of the Symposium, there were several chairmen and discussant-rapporteurs, one each for the several items of the agenda, as described below:

"Fertility and human rights"

B. Afnan (Chairman)
M. L. Ernst-Henrion (Discussant-Rapporteur)

[1] See *Official Records of the Economic and Social Council, Fifty-second Session, Supplement No 3*, para. 166.

"Mortality and human rights"

K. Sekyiamah (Chairman)
L. Baumgartner (Discussant-Rapporteur)

"Internal migration and human rights"

C. Tomuschat (Chairman)
P. O. Ohadike (Discussant-Rapporteur)

"International migration and human rights"

C. B. O. Wennergren (Chairman)
P. Laroque (Discussant-Rapporteur)

"The implication of population trends for the formulation and exercise of human rights"

G. Dib (Chairman)
K. C. Pant (Discussant-Rapporteur)

"The roles of the community, the state and other institutions in safeguarding and promoting human rights in the light of population trends"

K. M'Baye (Chairman)
H. Gros-Espiell (Discussant-Rapporteur)

"The role of international organizations in safeguarding and promoting human rights in the light of population trends"

S. Y. Chikin (Chairman)
R. N. Gardner (Discussant-Rapporteur)

"Formulation of concepts and other action required to safeguard and promote human rights in the light of population trends" (summary of conclusions)

A. V. Toteff (Chairman)
T. Ould-Daddah (Discussant-Rapporteur)

The last two days of the Symposium were devoted to the approval of the report; A. Vanistendael chaired those meetings.

14. The general goal of the Symposium was to formulate for the World Population Conference expert scientific opinion on the interrelationships between population and human rights.

15. More specifically, the goal of the Symposium was to provide inputs for the World Population Plan of Action. The Population Commission, in setting forth the terms of reference for the Symposium, considered:

"that the human rights to be discussed should not be confined to family rights, since the international instruments on human rights which were the object of consideration were related to the rights of individuals as well; they referred to civil, political, economic, social and cultural rights. While jurists could be expected to play a distinct role in the Symposium, the interdisciplinary character of the meeting made it desirable that persons from other fields should also be included among the participants. Particular stress was placed upon the importance of the status of women as an issue in human rights. It was also mentioned that one of the questions to be discussed should be the right to family planning information and means taking into account the traditions, culture and other conditions prevailing in each country." [2]

16. The Symposium accordingly devoted its attention to the human rights standards which have a direct influence on the three main demographic variables, namely, fertility, mortality and migration. Although the Symposium did not reach a consensus on a number of issues that were discussed, there was, nevertheless, an area of general agreement. A summary of the main conclusions reached during the Symposium is given below.

[2] See *Official Records of the Economic and Social Council, Fifty-fourth Session, Supplement No. 8*, para. 35.

I. Summary of conclusions

A. *Basic considerations*

The Symposium based its discussions on the following considerations.

17. There was acknowledgement of the necessity and importance that every State should have a population policy, directed to improving the quality of life of the country's population. Such a policy must be regarded as an essential element in an integrated plan of action for economic and social development. While it must be recognized that certain States needed measures to curb their rate of population growth, it must also be recognized that it was not possible for States or the international community to solve their current social and economic problems by relying exclusively on such measures.

18. The sovereignty of States in formulating their population policies with due regard for internationally accepted human rights was acknowledged.

19. It was acknowledged that while there was a world population problem and many countries shared a community of interest, there were great differences among countries in their states of demographic evolution and levels of economic and social development. The question of human rights in the developing and developed countries was said to differ in some crucial respects because of great disparities in levels of living which also existed to some extent among the so-called "marginal populations" in some industrial societies.

20. There was acknowledgement of the impossibility of exercising fundamental human rights without the creation of adequate economic and social conditions for their enjoyment.

21. There was reaffirmation of the value and importance of international human rights instruments, as they were essential to safeguard the life, liberty and dignity of the individual and to ensure the full development of his personality. All the human rights relating to population problems contained in international instruments would be implemented more fully and rapidly, if the struggle against under-development included the promotion of an independent socio-economic policy and change of the internal structures of society, based on the principle of the dignity and worth of the human person.

B. *Main conclusions*

22. The Symposium reaffirmed the right of couples to determine the number and spacing of their children freely and responsibly, as stated in the Teheran Declaration, and the right of persons to have access to the relevant information, means and methods for the implementation of such decisions. The Symposium stressed, however, that a population policy should not be limited to matters affecting family formation, but should also deal with such matters as population distribution and international migration.

23. The Symposium recognized the importance of the right to procreate and drew attention to the necessity of defining the scope of that right as well as the right not to procreate. It was said that sex education and information should be made universally available and integrated with the education necessary to implement the right of the couple to determine the number and spacing of their children freely and responsibly. It was pointed out that in the case of children and young persons, care should be taken that such education be imparted under proper and qualified guidance and supervision.

24. Concerning the difficult and delicate problem of abortion, the Symposium discussed the various human rights aspects, particularly in relation to the right to life and to the right of the woman and family to decide freely on such matters as those relating to physical integrity and mental health. It was considered desirable that the State and the international community should try to reconcile the rights involved in that matter. Whatever solution might be adopted, a system of control designed to protect human rights and involving the participation of parents, doctors, judges, social

workers and others would be required. Any recommendations relating to abortion should have the fullest regard to the needs and socio-cultural values of the various countries, and should take into consideration complete medical knowledge of the implications and consequences of abortion, both for the mother and for her future children.

25. [illegible]
enablin [illegible]
promoti [illegible]
importa [illegible]
execution of population policies. The improvement in the legal position of women, who were becoming increasingly aware [illegible]

lation be updated so that women's rights in the various aspects of life mentioned above would be supported by proper enforcement. It was essential to ensure to women full equality with men, especially equal access to education and employment, so that they would not be inclined to find fulfilment solely in motherhood.

26. The Symposium reaffirmed the importance of the right to the enjoyment of the highest attainable standard of health as recognized in United Nations instruments and the constitution of the World Health Organization It was recommended that services to the whole population be expanded, and particularly the training of physicians and supporting staff, to reach people at the "grass-roots" level

27. The Symposium also reaffirmed the right of everyone to adequate food and nutrition. It stressed, in particular, the necessity for the elimination of hunger and malnutrition as a general priority objective in the attainment of economic development and social justice It was pointed out that in some countries agricultural development, particularly food production, needed to be accelerated by such means as land reform and the availability to developing countries of agricultural research and technology

28 The Symposium also reaffirmed the right to life of populations threatened by hunger and of ethnic minorities threatened by the encroachment of so-called "modernization"

29 [illegible]

international social order directed to the solutions of population problems, while having regard for human rights and respect for the sovereignty of States and the requirements of social progress and economic development

30 Concerning internal migration, the Symposium recommended that States should promote adequate legal measures and set up practical machinery for the implementation of measures to ensure the exercise of migrants' rights Local authorities might play an important role in that respect.

31. In view of the relation between the condition of rural areas and population questions, especially in relation to migration to cities and towns, the Symposium emphasized the need for social, economic and cultural development of such areas. Some participants considered that such development would also lead to a lowering of fertility rates in rural areas

32 When examining international migration, the Symposium did not think it realistic in the current state of international affairs to suggest specific measures to enlarge the scope of international legislation in that field It was noted, however, that the study of the situation in developing countries showed that the compelling interests of those countries might lead, in certain circumstances, to restrictions of the freedom to migrate across national boundaries, with full respect, however, for the relevant provisions in the Universal Declaration and the international instruments With respect to international migration, the Symposium considered the "brain-drain", which deprived the developing countries of some of their most technically qualified and useful citizens. While recognizing the difficult situation resulting for developing countries from such movement and the general need to slow down the "brain-drain" in the interest of those countries, participants held different views as to the strategies which were, in the light of basic human rights, suitable and acceptable

33 Concerning the rights of the migrants in the receiving countries, the international instruments showed important gaps which it was desirable to fill It was deemed necessary that after a certain period of residence and work any differential treatment between foreigners and nationals concerning employment or the choice of residence be reconsidered It was suggested that consideration should be given to the progressive equalization of the treatment between foreigners and nationals concerning access to professional training and any other form of education In that connexion, qualifications obtained in the home country should be given due weight It was felt that the right of the migrants to be reunited with their families should be implemented That implied an obligation by the Government of the host country to provide the immigrant family with adequate living conditions, especially as regards housing

34 The Symposium called attention to the link existing between the rights of migrants and the settlement of tensions between migrants and nationals The emigrant's country and the host country should co-operate in helping the migrant to adjust to the new society, while at the same time retaining as many elements as possible of his national culture

35 It was considered necessary to make adequate provisions for dealing with the migrant's vulnerability regarding the protection of his rights at national and international levels At the national level, it appeared desirable to provide for representation for the immigrant in his new locality and new enterprises Since bilateral negotiations between immigrant and emigrant countries might reflect economic and political concerns to the prejudice of the human approach, it was suggested that a suitable international body should be available to lend its good offices as a third party in those negotiations, with a view to ensuring that the human rights of migrants should be safeguarded

36 It was considered that prior education of migrants in the culture of the host country, as well as a corresponding education of the people of the host country, could reduce prejudices and help the immigrants to exercise their rights effectively

37 The Symposium recalled the right of individuals and groups to participate actively in the elaboration as well as in the implementation of population policies in the context of development policies It emphasized the necessity of imparting civic and political education to assist individuals to understand population problems and to motivate them to act in furtherance of the welfare of the community

38. On the other hand, the Symposium emphasized the need for the active popular participation of all elements of society, individually and through associations, in the formulation and implementation of population policies, especially those affecting human rights and the general economic, social, cultural and political life of their countries It was also considered essential to promote the role of associations, such as labour unions, women's groups and religious and cultural and humanitarian organizations, in speeding up the development of general awareness of population problems and other relations to human rights

39 Concerning the role of the State, it was recognized that Governments should exercise their authority as regards population and human rights through various channels, especially through voluntary organizations oriented towards information and education in the field of demographic policy. State action might also be exercised directly through legislation and regu-

lation directed to influencing population trends, with full respect for human rights and fundamental freedoms as defined in international instruments. In that respect, it was considered important for the population to have easy access to effective legal remedies.

40. A large measure of agreement was reached on the right and duty of States to ensure that the population, at all levels and without discrimination, should be aware of the means to regulate fertility and have access to such means and services. It was emphasized by many participants that the means offered should be socially and culturally acceptable. Without adequate information and without effective access to means of contraception, couples could not exercise with full responsibility their right to decide on the number and spacing of their children.

41. The Symposium considered that the State had considerable leeway in implementing a family planning policy through education, instruction and persuasion and that such measures were preferable to coercion.

42. It was, none the less, stated that population problems in many developing countries were so acute that harsh alternatives might have to be considered for the implementation of policies, necessitating intervention by the State. It was, however, agreed that the right to decide the family size freely and responsibly ruled out duress or coercion on the part of the State. Moreover, in the application of family planning measures, there should be no discrimination against any particular group in the community. Couples, in determining the size of their families, should take fully into account the interests of the children and the general welfare of the community, as well as the requirements of economic and social development in the light of current population trends.

43. Aware of the complexity of international relations, that the policies of one country might affect other countries, and that human rights and population questions were linked with environment problems, as well as with the excessive and irrational use of the capital represented by the world's non-renewable natural resources, the Symposium recommended that interdisciplinary research should be developed at the national and international levels, and that co-ordination be strengthened among all those involved in economic and social development and population planning and human rights, such as economists, sociologists, demographers, jurists, doctors, planners and civil servants. Due regard should be given to the involvement of government planners in the implementation of such interdisciplinary research at the national level.

44. At the international level, attention was drawn to the need for the expansion of genuine development assistance, greater international solidarity, the transfer of technology and capital to developing countries and a more equitable regulation of international trade. The results of negotiations at the various international conferences being held on political matters, such as disarmament, and on socio-economic problems would have an important impact on demographic trends in connexion with the formulation and implementation of human rights.

45. It was recommended that all international and regional agencies concerned, primarily those which were competent in the field of human rights and in population matters, should intensify their efforts and strengthen their co-ordination in order to carry out, in particular, the following functions:

(*a*) Collection and dissemination of information concerning human rights in relation to population matters;

(*b*) The offer of assistance for the training of qualified personnel, which should include imparting to such personnel a knowledge and awareness of human rights standards;

(*c*) In view of the scattered formulation of human rights relating to population problems, the preparation of studies the objective of which would be the clarification and systematization of such rights, as well as at the effective implementation of existing human rights instruments in relation to population problems.

II. Demographic variables and human rights

A. *Fertility and human rights*

46. It was noted that in recent times and especially in the past two decades, the continuing high (and sometimes rising) fertility in many parts of the world, and the control of mortality, especially of infant mortality, had presented the prospect of almost doubling the world's population by the year 2000. In fact, by the end of the century, the total world population would be nearly 6.5 thousand million people, which contrasted with a population at the beginning of this century of 1.5 thousand million and the current population of 3.8 thousand million.

47. It was further stated that despite some diversity among particular regions and individual countries, the differentiation between more developed and less developed regions was very sharp when expressed in terms of the crude birth rate, and that the same observation could be made in terms of more refined measures. The birth rate of less developed regions was nearly double that of more developed regions in the 1930s and 1950s, and the gap had continued to widen. In the more developed regions, reliable data showed a gradual decline in the average birth rate, but it must be pointed out that trends differed among particular regions, with marked fluctuations in some. Most recently, there had been a tendency for birth rates in more developed regions and countries to converge more closely towards a fairly low average. In the more developed regions, an average woman currently bore between 2 and 3 children, while in the less developed ones, she gave birth to between 5 and 7 children.

48. In order to evaluate fully what underlay that phenomenon, it was recognized by the participants that there was an interrelation between population growth, on the one hand, and economic and social development, on the other, and that the increasing rate of population growth was one of the factors which made it difficult to accomplish goals of economic and social advancement and full realization of human rights and fundamental freedoms.

49. The Symposium took as a basis for its discussion of the human rights aspects of fertility the series of relevant standards established in international instruments. Although the right to procreate was not included as such in the Universal Declaration of Human Rights or in the Covenants on Human Rights, participants were generally of the view that it was implied in the right of men and women to marry and to found a family, which was recognized, *inter alia*, in article 16 of the Universal Declaration of Human Rights.

50. The Symposium recalled that the United Nations General Assembly, while recognizing the sovereignty of nations in the planning and implementation of their own demographic policies, had introduced the principle that each family must be able to determine freely the number of its children (General Assembly resolution 2211 (XXI)).

51. It was also recalled that two years later, in 1968 at Teheran, the International Conference on Human Rights had expressly stressed the existence of a link between population growth and human rights (General Assembly resolution 2442 (XXIII)). In its resolution XVIII (12 May 1968), the Conference had recognized that if population growth in some areas followed a more moderate pace, it would enhance the conditions for offering greater opportunities for the enjoyment of human rights and the improvement of living conditions for each person.

52. It was further recalled that the International Conference on Human Rights considered that couples had a basic human right to decide freely and responsibly on the number and spacing of their children, and also a right to adequate education and information in that respect.

53. The Symposium observed that resolution XVIII of the International Conference on Human Rights made the following changes from provisions in General Assembly resolution

2211 (XXI): the right of each family to determine the number of its members was raised to a fundamental right; the word "family" was replaced by the word "couple"; and the right to *information and education in the field of family planning* was expressly laid down as a corollary of the right to decide on the number and spacing of children.

54 A suggestion was made that the provision existing in the Universal Declaration of Human Rights and the International Covenant *should be made more comprehensive by* supplementary provisions which might set out new rights, possibly including a more explicit mention of the right to procreation. Some participants were of the view that the world situation had changed to a large extent since the Universal *Declaration had been adopted in 1948. According to some* participants, one of the difficulties encountered was insufficient co-ordination between various United Nations bodies, which resulted in a certain gap between the instruments relating to development and those dealing with human rights

[illegible]

56 The majority of the participants of the Symposium expressed the view that in matters of family planning the final decision should lie with parents rather than with the State Some participants referred to the Declaration on Social Progress and Development of 1969, which stated that the right *to decide freely and responsibly on the number and spacing of* births was an "exclusive right" of parents (General Assembly resolution 2542 (XXIV)). That instrument explicitly recommended the dissemination of not only the necessary knowledge, but the means to render the exercise of that right effective

57. It was stressed by some participants that the dissemination of family planning information should be carried out in the context of an understanding and sensitive approach to social customs and cultural beliefs of the people, if it was to be successful Popular participation at the "grass-roots" level on the part of men and women could have considerable impact on the solution of demographic problems as they applied to the general welfare of the community. It was also *necessary that family planning work should be integrated into* the over-all plan of social and economic development and [illegible]

[illegible] was expressed [illegible] children what [illegible] lectual and [illegible] irresponsible [illegible] other hand, that such an interpretation of the responsibility [illegible] *parents towards their children would lead to the poor being* prevented from procreation and would amount to socio-economic discrimination

59. It was also said that, in the field of procreation, the question of the weight to be accorded, respectively, to the opinion of the man, the woman, the couple or the family as a whole was a complex one, which required further study as [illegible] of "responsibility" enun- [illegible] tional Conference on [illegible] participants believed [illegible] *were strong grounds* for leaving the decision to procreate or not to procreate in the last resort to the woman because of her predominant biological role and the health hazards which she *might experience* in procreation.

60 Attention was drawn by several speakers to the value placed on fertility in some societies, where it strengthened those *family ties which formed the basis of the security of the* members of the extended family.

61 Persons entrusted with the functions of education and information in the field of family planning should take account of that concept in traditional societies while attempting to make *couples understand that the common interest required* that they should control their rates of fertility It appeared preferable in the rural areas to elicit the active co-operation of those who naturally exerted an influence in the community as being those most likely to influence attitudes towards family size

62 The question whether the right to procreate existed also out of wedlock was answered affirmatively by several participants on the basis of such resolutions of the United Nations as the Programme of Concerted International Action for the Advancement of Women (General Assembly resolution 2716 (XXV)) However, some participants qualified that view on the ground that the child had a right to paternal *presence and care as a prerequisite of his harmonious* psychological development It was observed that recognition of the right to procreate did not place anyone under an obligation to do so Some participants expressed the view that it was necessary to express that right not to procreate more explicitly

63 It was the view of the Symposium that an obligation existed to care for the child of an unwanted pregnancy It was also the view of some participants that unmarried women, such as workers or young students, should be protected from unwanted pregnancies

64 The influence of legislation on fertility was stressed by many participants, for example, raising the minimum age for marriage, registration of marriage, restriction of child marriages and betrothal of young girls before puberty, minimum working age and age requirements for compulsory education could all *affect fertility Some participants said, however,* that the impact of such laws on population trends was difficult to assess and that hasty generalizations should be avoided.

65. It was generally believed that equality under the law was one of the prerequisites of free and responsible decision-*making in all fields, including the planning of family size.* Many studies showed that women would prefer fewer children than they actually had if they had a choice Birth rates were very low in all countries in which the law provided for equal *rights and responsibilities for men* and women, and where conditions were otherwise favourable for independent decision-making

66 It was further stated that marked differences persisted between men and women in the enjoyment of various human rights Those differences were, to a great extent, caused, it was *said, by economic,* social and cultural factors that determined sex roles and led to discrimination against women. In many societies, women were still viewed only as dependants on their husbands and were *not considered in need of the education,* training and access to economic opportunities normally provided for men Equal rights of women to education, health and well-being and to the development of their personalities through education was stressed by many participants. Unpaid work at home, *early marriages* and early childbearing, often decided by parents and husbands, deprived them of other opportunities, and the only roles remaining to them were those of wife and mother whose *prestige grew with the number of her children* On the other hand, the implementation of women's rights and participation of women in the life of the community had a wholesome impact on the exercise of *their right in determining* the size of their families

67. Because of the correlation between women's education, gainful occupation, access to health services, and legal and factual position in the family and society, on the one hand, and family size, on the other, it was not surprising that high birth rates were normally found in societies where women lacked educational *opportunities* and hence other options than a role as a mother.

68. Participation in the political, social and cultural life of the society gave women alternative roles; they did not thereafter derive their identity and value from their roles as mothers of large families. Where women participated in decision-making in a society, they often became a strong force for social change. Their impact was shown especially in areas of education, employment and the family, including questions of health, maternity and child care.

69. It was suggested by a few participants that the developed countries should be urged to achieve a zero rate of population growth. The majority of the participants did not agree with that suggestion, stating that the attiude of each counry in respect to population growth was necessarily dictated by the economic and social situation prevailing in that country, and that in a developed country, the betterment of the situation of the poor and aged might necessitate population growth. Some other participants, on the other hand, stated that certain developed countries might find it beneficial to have a period of population decline for the well-being of their populations in view of the high rate of consumption of natural resources in those countries.

B. *Mortality and human rights*

70. The Symposium considered the interrelationship between morbidity, mortality and the exercise of basic human rights to life, adequate food, enjoyment of the highest attainable level of physical and mental health and necessary medical care.[3]

71. High morbidity and death rates, malnutrition, starvation and inadequate health services were considered to be obstacles to sustained development and adequate fulfilment of specific human rights.

72. It was stated that in many areas of the world, a reduction in the death rate following the expanded application of modern public health measures and improvement of living conditions unaccompanied by a corresponding reduction of the rate of fertility, had resulted in a sharp increase of their rates of population growth with diverse economic, social and cultural effects. It was further noted that differences still persisted among countries at different stages of economic, social and political development; that there were also differences in that respect between urban and rural populations, among social classes, ethnic groups and the sexes; that infant mortality was still high among poor populations (about 140 per 1,000 as an average in developing countries against 27 per 1,000 in more developed regions).

73. It was considered a matter for concern that expectation of life at birth (which was a better index of national well-being than mortality rates) in developing countries still lagged far behind the average of the more developed countries.

74. It was further stated that levels and patterns of food consumption were also different among countries at different levels of development and culture (with a preponderance of foods of low nutritional value among people who were deficient in the consumption of proteins), and that starvation and malnutrition were still contributing causes of morbidity and mortality for millions of people in the world.

75. The participants also were of the opinion that health services were still inaccessible to large segments of people and that the provision of free health services to the whole population envisaged in the Declaration on Social Progress and Development was still far from being a reality in the majority of the countries of the world.

76. Difficulty was encountered in the discussion with regard to the question of when human life began. Some participants said that it was questionable whether real and meaningful human existence began before approximately from 4 to 6 weeks after fertilization. Intervention before that time might be classified as contraceptive rather than distinctly abortifacient.

77. Several participants took the view that there could be a conflict between the rights of the pregnant woman and those of the child to be born. Those participants felt that a balance must be found between the child's right to life, on the one hand, and the protection of the woman and the family, on the other. Some participants considered that if the birth was detrimental to the mother or the family, a balance could be reached by considering abortion to be justifiable in cases where: (*a*) the life or health of the mother was endangered; (*b*) the pregnancy was the result of rape; (*c*) there was a high risk that the child would be born physically or mentally abnormal, thus compromising the equilibrium of the family; (*d*) the mother or the family were in such a psychological, social or material situation that the birth would jeopardize the existence of the family. That meant that freedom of abortion would not be recognized in general and absolute terms. It was also said that in any case a system of control would be required involving parents, doctors, judges and social workers.

78. Some participants stated that abortion had been practised for ages and that it was a reality which could not be ignored. One of the participants maintained that restrictive abortion laws were created in the Western world and, in his opinion, spread throughout the world by colonialism. Others contested that statement.

79. Some participants were of the view that it was premature to formulate international norms with regard to abortion. Action could be taken at national or local levels. The position to be adopted depended on many factors, particularly those of humanitarian character. Care must be taken so that in any event cultural and national groups were not discriminated against. The adverse effects of repeated abortions on the health of the mother and the health status of her unborn children were also mentioned as matters for concern.

80. There was consensus that those countries which decided to legalize abortion should so formulate their laws as to take into consideration full medical knowledge of the implications and consequences of abortion, both for the mother and for her future children. The problem was raised, with some anxiety, of the negative effects of abortions, particularly repeated abortions, on the health of the mother and the health of as yet unborn children.

81. It was pointed out that even those strongly against legalized abortion were very perturbed by the large number of abortions performed under unsatisfactory and unhygienic conditions by poorly trained practitioners. That resulted in great suffering and extensive maternal morbidity and mortality, with consequent heavy demands on all health institutions and personnel to the detriment of services and families.

82. Note was taken of the prevalence of discriminatory practices with respect to abortion based on income levels and socio-economic status. For example, rich women crossed the borders of their countries, had legal abortions abroad and returned home safe, physically and legally.

83. Some participants were of the opinion that effective family planning programmes could not be readily established until families realized that too large a number of children created difficulties for their education and that, because of declines in infant mortality, families no longer needed a large number of births to have a few children survive.

84. Reference was made by some participants to allegations concerning certain practices which might amount to genocide against various ethnic and social groups. Strong condemnation of any practice amounting to genocide was voiced by the participants.

85. The problems associated with increasing life span and particularly with the extr[illegible]ily costly methods currently available for keeping [illegible]e" were a[illegible] of discussion. The question [illegible] the crite[illegible]ed when deciding who [illegible]t cos[illegible], but no specific concl[illegible]

[3] *Universal Declaration of Human Rights*, articles 3 and 25; *International Covenant on Economic, Social and Cultural Rights*, articles 11 and 12 (General Assembly resolution 2200 A (XXI), annex).

86 The question was also raised whether the individual should have the right to die with dignity or whether physicians should be asked to continue to utilize extraordinary means of treatment of no permanent benefit to patients with terminal illness. No consensus was reached on the matter. Some delegates expressed concern at the far-reaching implications from the ethical, emotional and scientific points of view of any attempt to prolong life and advised great caution in the making of *such attempts*.

87 [illegible] be made to formulate conditions under which controlled trials and individualized studies might be done with full respect for *human rights and fundamental freedoms*

88 Studies had revealed that large numbers of the world's people were hungry and undernourished Millions of people, especially in the developing countries, were victims of malnutrition and starvation The Declaration on Social Progress and Development acknowledged that one of the main goals for the attainment of social progress and development was the elimination of malnutrition and hunger Intensified international co-operation was urgently needed to help deal with the problem

89 The Symposium noted that recent scientific data indicated that malnutrition (*in utero* and in the first years of life) could result in irreversible mental retardation. The social and economic cost to society of maintaining the mentally inadequate was large. In addition, the individual's human rights, as well as those of the family, were affected

90 The Symposium observed that the nutrition gap was widening between rich and poor countries and between rich and poor individuals The world was faced with shortages of food and a rapid depletion of resources If there was to be equality in the enjoyment of human rights, various measures were required Scientific and technological co-operation and international economic assistance could play a useful role in *making the results of agricultural research and the benefits of* increased agricultural efficiency available to developing countries The creation of food reserves and improvements in the regulation of their distribution and transportation could make it possible to assist areas where shortages due to droughts or crop failures occurred Land reform could play an important role by increasing agricultural productivity and raising the general level of living Some participants further stated that since the right to an adequate level of living, including food, as recognized in article 25 of the Universal Declaration of Human Rights, would remain a distant ideal for many developing countries unless their economic growth was accelerated, developed countries had the responsibility to provide assistance to developing countries on favourable terms and to offer equitable and stabilized prices for their primary commodities.

91. Although the right of everyone to the enjoyment of the highest attainable level of physical and mental health was a fundamental human right, that right had not yet been achieved by many of the world's peoples It had been defined as more than the reduction of preventable mortality and morbidity or the provision of institutions and professional personnel for the treatment of the sick. It was the assistance given to a person, a family or a community which helped them to attain what the World *Health Organization had described* as "a state of complete physical, mental and social well-being".

92 Health was thus dependent upon a wide spectrum of measures Those measures concerned the prevention of disease, maintenance of adequate nutrition, income and communications and the provision of education and leisure so that every individual could maintain his own health, have an adequate level of living and enjoy the basic human rights that fostered optimal development of each individual's innate capacity for growth.

93. Basically, the degree of economic, social and cutural development combined with genetic factors determined longevity Currently nutrition was probably the most important single factor influencing health and mortality, apart from the ignorance of specific measures to control many diseases and the *inability to implement fully* those measures already known and understood

94. The relationship of mortality to human rights was a constantly changing one The past two decades had seen the emergence of many new concepts, scientific and technological breakthroughs, solutions to some problems and the emergence of others As science and technology resolved a specific problem, it appeared imperative that ways should be found promptly to carry the new formulae into effect, rather than to make resounding resolutions on the subject There were often political, economic and cultural, technical and emotional reasons why action was difficult, but *reasonable, rational efforts at* implementation could usually lead to some success—if the problem had been properly analysed and a workable solution adopted

C *Internal migration and human rights*

95 It was generally acknowledged by the Symposium participants that in the current century of increasing industrialization and population growth, there had occurred a significant intensification of internal migration Population growth and industrial progress had combined to speed up, in particular, the *momentum of movements from rural to* urban areas That trend was reflected in the rapid pace of urbanization The world's urban population, it was estimated, had nearly doubled between 1950 and 1970, from somewhat over 700 million to more than 1,350 million Even more rapid had been the increase in the developing regions, in which the urban population in 1970 was two and a half times as large as in 1950 Having grown at an average rate of 4 6 per cent per annum, the proportion of urban population in the developing countries had risen from 16 per cent in 1950 to 26 per cent in 1970.

96 It was also pointed out that with possibly half of the urban growth in those countries due to the influx of migrants into the cities, the economic and social dimensions of internal migration had acquired great significance Among the motivations to migrate, economic and social factors were known to be paramount That second exodus, which had become a characteristic of the majority of the developing countries, was largely due to a growing demand for agricultural land and to low levels of agricultural productivity Those facts were linked to disparities in the system of land distribution and to the economic attraction derived from the growing industrialization of the cities

97 It was recognized that to look upon those migrations only *in negative terms and to conclude that the process of* urbanization was detrimental to all progress would be an over- [illegible] The transformation of [illegible] tunities for economic, social and political participation, as compared with rural areas Likewise, urban residence might be conducive to changes in traditional modes of life, leading towards the emancipation of women and the adoption of more appropriate reproductive patterns. Many participants stated *that the evidence also suggested that, as bad as they were, the* living conditions of the rural migrant in the city were, at least in certain aspects, superior to those prevailing in the rural areas However, those potential or relative advantages of urbanization contributed little towards resolving the more immediate and tangible effects on human rights of large-scale migration and rapid urbanization.

98. Apart from the personal and social disorganization which might be associated with migration and which found its expression in different forms of anti-social behaviour, affecting in many instances particularly the young, rapid urbanization did create problems in a number of areas, including housing, health, nutrition, transportation, other social services and amenities, and environmental conditions. Migrants unable to find adequate employment or any employment at all were forced to live in squatter settlements or inner-city slums lacking even the most basic facilities. The pressure on residential land and housing caused land speculation and excessive rents and generally tended to depress levels of living further. Those conditions gave rise to what, in the Latin American context, was often referred to as "marginality" in an economic, social or political sense, where the persons affected did not participate adequately in those spheres of life. Migration to the cities did not leave the rural areas unaffected: the selectivity of the migration process could not only draw away the most dynamic elements of the rural society, but could divert capital and other financial resources as they were required by the rapidly growing cities.

99. The basic standard provisions of international instruments relating to the problems of internal migration recognized only freedom of movement and residence within the territory of any State, as proclaimed in article 13 (1) of the Universal Declaration of Human Rights and in article 12 (1) of the International Covenant on Civil and Political Rights (General Assembly resolution 2200 A (XXI), annex). The right of the individual to work, including his right to make a living by his free choice of employment, was recognized in article 23 of the Universal Declaration and article 6 of the International Covenant. Those rights had an important bearing on matters relating to internal migration. Among international instruments concerned with the elimination of discriminatory practices should also be mentioned, in particular, article 5 of the International Convention on the Elimination of all Forms of Racial Discrimination. It was mentioned, however, that at the time the Declaration had been adopted, in 1948, problems of internal migration as socio-economic phenomena had not been as conspicuous as in recent years. On the basis of the examination of the implications of internal migration, it appeared to many participants to be desirable to try to reaffirm and develop human rights pertaining to that area so that they fully reflected the socio-economic nature of the problems involved. It might be pertinent to mention that some aspects relevant to those problems were already contained in the Declaration on Social Progress and Development (General Assembly resolution 2542 (XXIV)), which called for taking into due account "the diversity of the needs of developing and developed areas, and of urban and rural areas" in social development planning (article 8) and for "measures to overcome the adverse social effects which may result from urban development and industrialization, including automation; maintenance of a proper balance between rural and urban development, and in particular, measures designed to ensure healthier living conditions, especially in large industrial centres" (article 17 (a)), and for "comprehensive rural development schemes to raise the levels of living of the rural populations and to facilitate such urban-rural relationships and population distribution as will promote balanced national development and social progress" (article 17 (c)).

100. In view of the serious problems caused by the large influx of migrants into the cities, the participants examined the possibility of a need for and justification of coercion in the implementation of policies designed to curb that influx. It was suggested that some provision for coercion should be made if and when it should become necessary, and that the State might deem it desirable to formulate legal norms for the regulation of migration in the interest of the general welfare of the community. Those views did not, however, find favour with a majority of the participants. Another view expressed by some participants was that coercive measures might often be impracticable and indeed counterproductive. It was urged that legal or administrative impediments to freedom of movement might retard long-term development. Non-coercive measures designed to absorb the impact of internal migration and to influence the volume and direction of its flow would be more appropriate. Such measures would not infringe on the right to freedom of movement and residence within the borders of each State.

101. It was suggested that measures to absorb the impact of migration and to implement and safeguard human rights should be taken in areas both of the destination of migration and of its origin. Programmes for urban reform should be considered in that context. Regional planning for the location of industry, development and improvement of sanitation, housing, transportation, schools, hospitals, recreation and other social services should form part of such a programme. It should also embrace measures to end exploitation through excessive rents for housing or exorbitant prices for urban land. Laws should be revised which make possible such exploitation, allow *de facto* segregation to be effected through zoning and similar devices and establish unrealistically high construction standards. The improvement of squatter settlements and slum areas, as opposed to slum clearance, should be actively considered. As an alternative to the eradication of shanty-towns, their improvement should be considered, if cost and urgency permitted.

102. Centres of advice, recreation and training and machinery for the organization and integration of migrants should be established. Those measures and programmes should be complemented by rural development. Programmes designed to make agricultural land accessible to as many persons as possible and to bring about a more equitable distribution of land were of high priority. Some participants stated that steps could be taken in some countries to set a ceiling to the amount of land an individual could own, and that a system of progressive taxation on the potential value of the land be imposed. It was also suggested that measures should be taken to decentralize industry, giving special consideration to industries for the processing and transformation of agricultural products and production of agricultural implements. The importance of using appropriate technology both in agriculture and handicrafts was also stressed.

103. There should also be an emphasis on social investment in rural areas so that rural populations would not have to migrate to urban centres for education or health services. It was considered that educational systems in many countries had contributed to urban migration and should be reformed to emphasize skills useful for rural activities.

104. Since regions beyond major metropolitan areas were not able to offer the benefits of modern social amenities available in the cities, it was suggested that the Symposium should propose the formulation of a right of deprived regions to adequate compensation. Such compensation would provide benefits to those regions analogous to those prevailing in the more privileged areas.

105. A special case was made for temporary migrant workers, who probably constituted one of the most deprived and exploited groups. Special provisions might be formulated to guarantee protection and services to them, including housing, schooling, sanitation and social security benefits.

106. In many instances, migration posed serious threats to the rights of the family, especially where urban wages were based on the needs of a single person and poor housing facilities discouraged a worker's family from joining him.

107. The need for mass mobilization and the involvement and participation of migrants in social and political life through such means as non-governmental associations was stressed. Workers' organizations should play an important role especially in the cities; obstacles to the establishment of workers' organizations in rural areas—such as dispersed settlements, small populations and paternalistic relations in rural firms and establishments—should be removed. There should be a constant search for dynamic leaders and pressure groups to work on local authorities.

108 The participants recognized that the execution of such programmes and the implementation of the corresponding human rights would be a considerable task and would involve huge financial and organizational costs. The developing countries, which were most affected by these problems, would not always have the necessary resources Nevertheless, the enjoyment of and participation in the basic human rights involved were fundamental issues for the countries concerned It was therefore necessary that those policies should be integrated into national development plans in those countries Concern for social justice within those countries and between the developed and the developing countries led participants to think that active consideration should be given to the desirability of international study and co-operation for the development of those programmes through such means as information and assistance.

109 Lastly, the need to develop effective migration policies was stressed It was observed that demographic policies affecting migration had been in use in most west European countries Those policies had been essential for implementing physical planning programmes directed to preserving social and environmental settings conducive to the full enjoyment of life

D. *International migration and human rights*

110 International migration had been viewed in the past as a means for bringing about a better balance [illegible] lation and resources [illegible] tion pressure on lim [illegible] migration, an influx [illegible] to permit a more efficient use of abundant resources Although international migration might once have been as important as those theoretical arguments implied, its current capacity for solving the population problem was negligible. In the first place, restrictions on immigration, which had made their appearance around the turn of the century, had become almost universal Secondly, the high rate of population growth, especially in recent decades, and the absolute magnitude of the numbers involved made international migration impractical on the scale required to have any significant effect on population size and growth in those countries where there was a pressure on resources.

111. Economic and political factors continued to induce large numbers of people to leave their homelands In the past decade and even earlier, three types of international migration had become particularly important and had drawn widespread attention The first type was the emigration, particularly from developing countries, of workers without special qualifications, who, faced with the impossibility of finding adequate and reasonably well-paid jobs in their own countries, moved to the industrialized countries [illegible] better an [illegible] workers [illegible] internatic [illegible] the problem of refugees That problem had, to a great extent, found a solution in relation to human rights through the existing international instruments, such as the Convention of 1951 relating to the status of refugees and the institutional structure provided for in the Convention (General Assembly resolution 538 (VI)) The third type was the so-called "brain-drain" from the developing countries, involving the emigration of highly qualified workers who sought better opportunities in the more developed countries. That phenomenon had caused widespread concern, particularly in developing countries

112. It was noted that the United Nations had not recognized any right to migrate *per se*. However, among States Members belonging to certain regional intergovernmental organizations, labour's freedom of movement had been established. Existing international standards relating to migration included in particular:

(*a*) The right to leave any country, including one's own, and to return to one's country, as recognized in article 13 (2) of the Universal Declaration of Human Rights and article 12 (2), (3) and (4) of the International Covenant on Civil and Political Rights (General Assembly resolution 2200 A (XXI), annex). That right, as in the case of others embodied in the Covenant, was recognized in article 2 as applicable to all individuals within a country "without distinction of any kind, such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status",

(*b*) The rights to seek and to enjoy in other countries asylum from persecution Those rights were recognized in article 14 of the Universal Declaration of Human Rights and in the United Nations Declaration on Territorial Asylum;

(*c*) The Symposium took note of the close connexion between nationality and international migration and drew attention to the various conventions on nationality and statelessness It emphasized the importance for each person to have a nationality and in that context considered that arbitrary deprivation of nationality and the denial of the right to change one's nationality were not only contrary to the Universal Declaration of Human Rights (article 15) and other international instruments, but caused great hardship to migrants, often negating their rights relating to migration. The International Convention on the Elimination of All Forms of Racial Discrimination recognized the right to effective protection and remedies against discrimination on the grounds of race, colour or ethnic origin Attention was also paid in that connexion to the relevant instruments of the specialized agencies of the United Nations, particularly those of the International Labour Organisation (ILO)

113 The examination of international standards and their confrontation with actual conditions and practices led the Symposium to consider separately the following two main issues

(*a*) The gaps in the acknowledged human rights of migrants, distinguishing between the freedom to migrate and the rights of the migrants in the course of their journey and in the country of immigration;

(*b*) The degree of implementation of those recognized rights

114 There is a notable contrast between developed and developing countries with respect to international migration. It was said by some participants that while in the developed countries immigrant workers frequently lived in conditions inferior to those of national workers, immigrants in many of the developing countries sometimes occupied a dominant or privileged economic position It was considered by some participants that in order to prevent an undue influence of immigrants in the latter case, consideration might have to be given [illegible] ceptable standards Some developing countries, it was noted, had already taken steps in the direction of discouraging emigration The Symposium [illegible] and those of their families

115 The Symposium recognized that the rights of the migrant worker in the course of his travel and in his country of destination were defined in various international conventions, particularly the covenants on human rights and the ILO conventions and recommendations The migrant had a right to be protected at the time of his recruitment, during his journey and after his arrival in the country of immigration Discrimination between the immigrant and the national worker, as far as [illegible] sidered that there were important gaps in the protection of the rights of the migrant worker. In particular, participants were of

the opinion that the desirability of new or more elaborate norms with respect to the following areas needed to be emphasized:

(*a*) The elimination of all forms of discrimination with regard to choice of employment and residence after a certain period of time and the adoption of standards relating to equality of opportunity and treatment of migrant workers. The Symposium observed that such workers were not infrequently required to take up a given employment in a particular industry and locality which deprived them of free choice of employment and residence. Although in certain circumstances economic reasons might call for such restrictions, their continuation after a certain period of residence or employment appeared to the Symposium to be unjustifiable;

(*b*) The elimination of all forms of discrimination relating to opportunities for the migrant's occupation training and access to all types of education for the migrant's children. The Symposium considered that whenever possible the training and education of migrants should be such as would suit manpower needs of their country of origin, were they to decide to return;

(*c*) The affirmation of the right of the migrant to be joined by his family or to be followed by his family with a minimum of delay. That right, which was a corollary of the right of the family to protection by society, implied an obligation on the Government of the country of immigration to ensure, as in the case of its own nationals, satisfactory living conditions and especially housing for the migrant and his family;

(*d*) The social protection of migrant workers and the harmonization of social security systems in view of the fact that differences between such systems often deprived such workers of their rights. It was pointed out by some participants that by admitting foreign workers, States took a clear responsibility vis-à-vis such persons, who had a right to a certain stability in their life situation. Any migrant worker, therefore, should be advised of how long he was entitled to stay. Residence permits, if restricted in point of time, should be made renewable after a reasonable period;

(*e*) The easing of restrictions on the acquisition of nationality of the country of immigration. It was recognized that acquisition of citizenship was in several respects a prerequisite of the full exercise by migrant workers of their human rights in the receiving countries. National legislation appeared to be excessively restrictive as far as the conditions for obtaining nationality were concerned, particularly for foreign workers and their children who had been resident for a long period in the country of immigration. It was said that while all facilities for a rapid assimilation of the migrant should be provided, the migrant should also be offered ample opportunities to maintain and develop his own cultural identity;

(*f*) The grant, subject to reasonable conditions, of citizenship to the migrant's children who were born in the receiving country and who opted for such citizenship on the attainment of majority.

116. Although allowance had to be made for the gap between standards and actual conditions, the disparity between the human rights of migrant workers and the realization of their rights appeared to many participants to be exceptionally great. According to those participants, the reasons for that restricted exercise of their rights were, *inter alia*: (*a*) a lack of knowledge of their rights on the part of the migrant workers; (*b*) their general lack of familiarity with conditions in the country of immigration; (*c*) the presence of a language barrier; and (*d*) fear of losing their employment and of a confrontation with public authorities. Those problems were aggravated because of the absence of suitable machinery for the protection of migrant rights. Migrants often hesitated to avail themselves of existing machinery which failed to take into account their unfamiliarity with the language and the legal system of the country of residence. The Symposium recognized that several courses of action, at the national level as well as through bilateral co-operation, were open to remedy that situation. Among the most important was the establishment of migrant associations of facilities for their repesentation before local and national public authorities and before employers. The minimum requirements in that regard included procedures for consultation between migrant workers, on the one hand, and public authorities, on the other. It was suggested by some participants that consideration might be given to the grant of certain civil and political rights to migrants at the local level. Foreign workers should as far as possible be given equal rights in trade unions, and it would be desirable if they could be elected to union leadership. Considerable improvements in the implementation of migrant rights could be effected through joint efforts by the Governments of the countries of emigration and immigration. Traditionally, negotiations on the status of migrants had been dominated by economic considerations, and questions relating to the implementation of human rights had been largely neglected. Several participants were of the opinion that the necessary co-operation and negotiation between the countries involved would be greatly facilitated if an international agreement were to be formulated establishing the necessary basic principles and guidelines. Within the context of these agreements, bilateral negotiations could be conducted between Governments. The Symposium was of the view that a suitable international body might be entrusted with the function of making available its advice and good offices for the protection of the human rights of migrant workers.

117. The Symposium recognized that the measures previously referred to, which had the objective of promoting the human rights of migrant workers, should be supplemented by intensive educational efforts. Before leaving their country or upon arrival in the country of destination, migrants should receive the information and instruction necessary for their rapid integration into and active participation in their new communities. The people of the country of immigration should also be informed about the problems posed by immigrants, their contributions to the country and the need to help them take their proper place in the community.

118. The Symposium also recognized that the migration of workers was to a great extent, the result of economic conditions and particularly of disparities in levels of living between countries of immigration and emigration. Although the precise contribution of migration to the development of the receiving countries was not known, there appeared to be little doubt that it had made a considerable contribution. The same was not necessarily true for the countries of emigration. Although the emigration of workers might alleviate population pressures, there were increasing doubts in such countries about its benefits. Many participants were of the view that a change in the international distribution of labour by creating additional employment opportunities in countries of emigration through investments and joint ventures would provide a more acceptable solution for the developing countries. Although the economic and other advantages of emigration for the individual worker were substantial, the displacement involved in migration caused certain disadvantages to the parties involved, even if the rights of the migrant were well protected.

119. While the principle of the right of emigration was not questioned, the view was expressed by some participants that under certain conditions that individual right might have to be made subject to certain conditions. Such a situation, it was argued, could exist in the case of the "brain-drain". The emigration of highly qualified and trained personnel, usually educated at great cost to the society, especially where education was free, not only signified a loss of investment in human capital, but deprived the country of the substantial contribution those workers could make to its development. The impact of the "brain-drain" on the economic and social development of a developing country could be substantial. Although some participants suggested that there might be arguments in favour of some degree of control, it was recognized that it would not be advisable to prohibit that type of emigration.

120. It was suggested that more attention should be given to alternative ways of discouraging the emigration of highly

trained specialists and scientists. One such scheme, addressed to those going for study abroad, would be to introduce, with the co-operation of both Governments involved, a legally binding contract for those students to return after the completion of their studies. Since the agreement would be voluntary, that solution would not affect human rights. It was, however, doubted whether such a scheme would be effective, as it was [illegible]

III. Implications of population trends for the formulation and exercise of human rights

121 While participants of the Symposium agreed in broad and general terms that there was some [illegible] inadequate reali[illegible] tion situation, t[illegible] portance of the [illegible] misery of the m[illegible] in the third wor[illegible]

122 The disagreement centred largely on the question of the extent to which rapid population growth was an obstacle to development. That disagreement was important in view of the almost unanimous opinion that the full realization of human rights, especially social, cultural and political, could be achieved in conditions of poverty and ignorance. The attainment of human dignity and the fulfilment of human personality and its potential could only be realized when a person was not haunted by fears of [illegible] [illegible] as requiring the State to abstain from certain acts and forms of behaviour. They were understood in a broad and dynamic sense, in which the attainment of minimum standards of economic, social and cultural life was basic

123. The variety of historical and cultural backgrounds, of political, social and economic structures and of situations relating to population had led to differences in interpretation of the interrelationship between population problems, human rights and development. That, in turn, accounted for different approaches in the field, which were not necessarily mutually exclusive

124 One view that received wide support was that whatever the socio-economic and political systems might be, excessive rates of [illegible] [illegible] such measures into development programmes with full regard for all human rights

125 Another view was that although there was an interrelation among population problems, denial of human rights and socio-economic structures, the best solution would consist in changing those structures in the direction of a just social and political order through participation of such voluntary groups as trade unions and youth movements. Simultaneously, measures should be adopted to cut an excessive rate of population increase

126 While conceding that population increases rendered the task of development more difficult, still another view stated that the real causes of under-development are to be found largely in the nature of the international economic and political system, with its precursors of colonialism and imperialism. That system, which had been responsible for the exploitation of many countries, was still draining off their resources to the richer countries. The greatest gains for human rights would therefore follow from fundamental changes in the structure of international relations and a reorientation of development strategies towards greater self-reliance, autonomy and selective disengagement from the current economic system on the part of developing countries. Those who held that view were of the opinion that even if rapid declines in fertility could be achieved, it was unlikely that the conditions of the mass of people would improve appreciably unless, at the same time, those necessary structural transformations were to be effected

127 Many participants held the view that the international community had a duty to strive towards an equitable and just distribution and use of world resources, including capital. Such a distribution of goods and services was necessary to make human rights a living reality, particularly in developing countries. It would facilitate the use of resources in developing States for further development and increase their industrial and agricultural productivity

128 The imbalance in per capita consumption of non-renewable natural resources between developed and developing countries was noted as aggravating disparities. The highly industrialized countries were depleting the world's non-renewable resources at a staggering rate. Apart from environmental consequences, that process caused a continuous rapid increase in the price of commodities vital for the development of the third world. As the latter could scarcely compete with the richer countries for those resources, its development was further retarded

129 None of the participants argued that the adoption of population policies was an end in itself. It was agreed that they must form part of a broader, credible strategy of human development and full implementation of human rights. Indeed, many participants argued that population policies should seek fertility control by paying more attention to social and economic changes in which rational choices in family planning become both desirable and feasible

130 In many countries, family planning had come about as a result of a transformation of social structures and institutions, and particularly as a result of the improvement in the status of women. In other words, population control had come about as a consequence of social progress and development. The integration of population policies into strategies of general development, which demonstrated both a will and ability to improve the general human condition, might also help to allay the suspicions of and resistance to fertility control that currently existed especially in the third world

131 The Symposium discussed whether it was desirable to adopt a new charter of declaration on human rights in the context of population problems and policies, since many profound changes had occurred in the international community since the drawing up of the Universal Declaration of Human Rights. Many participants pointed out that the Declaration illustrated the impact of values for which the free countries had fought the Second World War. It had also been drafted and adopted at a time when many countries had still been under colonial rule. Some members went on to state that the different human rights [illegible] and the specialized agencies and regional bodies concerned. Some participants emphasized, however, that it was more important at that stage to concentrate on the implementation of the rights that were already incorporated in existing declarations. In their view, the elaboration of further rights by the United Nations before effective strategies of action were devised to realize the rights which the international community had already proclaimed during a period of 25 years, would damage the credibility of the United Nations and might result in widespread cynicism regarding the whole process of the formulation of human rights. Viewed against the declarations and other instruments of the United Nations and various international agencies which have set forth the inalienable and fundamental rights and freedoms of the individual, the disparity between aspiration and reality was, according to one participant, so

overwhelming as to make the formulation and recognition of such declarations "sarcastic".

132. Throughout the course of the Symposium, there was concern among some participants about the possibilities and dangers of States using coercion. Most participants considered that coercive policies were unjustified and would amount to a serious denial of important human rights. Certain individual rights were so fundamental and inalienable, such as the right to life, freedom from degrading treatment and freedom of conscience, that any interference with them would be intolerable. Other participants argued that it was impossible to take a categorical position on that matter. There was first the problem of defining coercion. Some forms of action, like compulsory sterilization, might well be regarded as unjustifiable coercion, but it might be otherwise with fiscal and other measures which penalized parents of large families. Secondly, coercion might be applied in different areas; and it was impossible to say that it was unjustified in all circumstances. Some participants were not willing to agree, for example, that a State was never justified in restricting or qualifying the right of movement or emigration in order to mitigate problems of unplanned urbanization or to deal with losses that arose from the "brain-drain". Thirdly, some participants felt that it was possible to exaggerate the conflict of interests between the individual and the State. In many countries, it was realistic to look at the State as interposing itself between the individual and powerful forces, both external and internal, which were exploiting national resources for the benefit of a privileged few. Nevertheless, the Symposium was unanimous in its view that it was of the utmost importance to insist that all population policies must pay particular attention to avoid violation of the fundamental rights of the individual, family and community.

133. Several participants stressed the importance of the inherent dignity of all members of the human family. Population growth, greater industrialization and increasing urbanization should not be allowed to lead to the "insectification" of man. People everywhere should have greater and more direct participation in decision-making at local levels. Appropriate means of ensuring real participation of all citizens should be available at all levels of the national life.

134. Population and development policies must seek to restore to people the full dignity of their personality by providing for a more meaningful life in which important decisions concerning themselves are made with their consent and participation. Some participants cautioned against a situation where basic human rights might be trampled on in a single-minded pursuit of economic development.

135. There were important implications also for the manner in which policies were formulated and implemented. Organizations of marginal people must be promoted and mobilized as important agencies for generating awareness on the part of their members and for the elimination of marginal conditions in their communities.

136. On the international level, so it was suggested, it was necessary to redefine the set of basic principles underlying "models" of development to which the peoples of the world could aspire, particularly those of the third world. Models of prosperity as achieved by many industrial societies might not be relevant to every country, since they might not correspond to the basic values of all peoples. New models must emphasize social and cultural values which were important to the lives of diverse communities.

IV. Roles of the community, State and other institutions in safeguarding and promoting human rights in the light of population trends

137. The Symposium was in agreement that community and state action in the population field should be formulated and implemented within a broad framework of economic and social policy, and that population problems and their solutions should be considered in the context of over-all development policies.

138. It was generally recognized that the State should play an active role in several respects in order to resolve or mitigate problems, including population problems, which in many countries make it very difficult to ensure the realization of economic, social and cultural rights. In that connexion, mention was made of various resolutions of the General Assembly and the Economic and Social Council, in particular General Assembly resolution 2211 (XXI) on population growth and economic development, which acknowledged "the sovereignty of nations to formulate and promote their own population policies". Several participants stressed their opinion that the State had the right as well as the obligation to formulate and carry out population policies with optimal targets, as part of a global attack against under-development and poverty. It was said that the individual had a corresponding right to expect that the State would take such an active role in achieving the realization of his economic, social and cultural rights.

139. Several participants emphasized the need for the State, especially in developing countries, to provide adequate education in population matters, adjusted to local traditions, and to carry out an effective policy of public information, since those were measures which advanced, without coercion, the development of an adequate individual and social consciousness of population matters.

140. Some participants attached great importance to the training of skilled personnel in the field of population and in general to the improvement of public administration in developing countries. In their view, the State should give high priority to measures designed to achieve those objectives.

141. Participants recognized that the State, which was primarily responsible for the achievement of social progress and development in each country, had a resultant responsibility to provide adequate health medical services to which the whole population had free access. The State thus had an obligation to adopt the necessary measures in that respect. The State was the only body with the capacity to undertake all necessary measures to that end. The view was expressed by several participants that the State also had a responsibility to make sure that safe and effective means of family planning were offered to all persons on the basis of adequate information in accordance with the recommendations contained in international instruments, particularly the Declaration on Social Progress and Development (General Assembly resolution 2542 (XXIV)). Several participants stressed the need to undertake all measures, including clear and objective information, so that individuals could effectively exercise their free choice in respect to family planning matters. The view of those participants was that the State should take appropriate measures to prevent all forms of discrimination, including discrimination based on socio-economic status, as regards the availability of such means and their access to the people.

142. The role of law as a means of changing attitudes on population problems was discussed. One view was that the impact of law on behavioural patterns and mores was often exaggerated, and that legislation was only a subsidiary means of effecting social changes, especially as regards deeply rooted family and cultural traditions. Other participants were of the opinion that the role of the law might be significant in various fields connected even indirectly with population matters, for instance, family relationships, minimum age and other requirements for marriage, the legal status of married and unmarried women, inheritance, tax policy and family subsidies and allowances. Reference was further made to various forms of direct intervention which the State might contemplate in order to correct undesirable population trends and structures, for instance, laws and regulations relating to health, mortality, methods of family planning, abortion, sterilization and mobility.

143. While acknowledging the central role of competent public authorities in advancing economic and social rights through adequate population policies, many participants stressed the obligation of the State, in implementing such policies, to ensure respect for civil and political rights and fundamental

freedoms, in accordance with the Universal Declaration of Human Rights, the international covenants on human rights and other relevant international instruments, as well as widely [illegible]

be subjected to scientific or medical experiments without free and informed consent, and freedom of thought, conscience and religion.

144 A number of participants attached great importance to the duty of the State to prevent discrimination on the grounds recognized by the United Nations Charter, the Universal Declaration of Human Rights and other United Nations instruments, while attempting to resolve population problems and to carry out population policies Various measures might prove necessary to ensure that all classes of persons, regardless of income and socio-economic status, should have equal access to the relevant education and social services. It was also said that care should be taken to adapt information on population, including family planning, to the needs of linguistic and vulnerable groups, such as rural population, racial or religious groups, migrant workers and indigenous populations, and to protect them effectively against practices derogatory to their dignity or dangerous to their health Some participants considered that the use of financial and other incentives in the implementation of population policies, especially family planning policies, should be subject to strict control in order to prevent abuses to the prejudice of less privileged classes

145 It was generally agreed that some of the most effective guarantees of human rights and fundamental freedoms were those which could be built into the machinery established to formulate and implement population policies In that connexion, many participants considered it essential that such policies should be elaborated, carried out and reviewed periodically with the active participation and under the control of all persons and groups involved or of their representatives. That was in [illegible]

arrived at only after a thorough and fair hearing before persons most directly concerned, and after those persons had been informed in clear language of all aspects of the matters at issue.

146. Stress was placed by many participants on the fundamental need for an effective system of remedies and control by judicial or other competent, independent and impartial authorities as regards decisions or measures taken in implementation of population policies It was considered that the scientific or technical character of the reasons which might be adduced to justify decisions or measures complained against should never constitute a ground for denying to the persons concerned or to their representatives the benefit of adequate [illegible]

on questions which might arise concerning the adaptation of certain traditional recourse procedures to the characteristics of issues involved in human rights and population

147 Several participants were of the opinion that non-governmental organizations, such as trade unions, women's associations, youth movements and religious bodies, could, because of their direct contact with the people, play a significant role in the formulation and implementation of population [illegible]

close watch on the implementation of population policies and by expressing public disapproval of short-comings and abuses

148. It was also considered important that non governmental organizations should have full access to the appropriate juridical channels in order to fill the gap caused by the frequent hesitancy of individuals to claim their rights

V. Role of international organizations in formulating human rights connected with population matters

149 It was recognized by all participants that international organizations and the United Nations system in particular had a vital role to play in assisting Governments to implement their population policies as an integral part of their efforts to enlarge the general welfare and the human rights of their citizens International agencies could help promote a broad consensus on the nature of population problems and on what ought to be done about them

150 There was general agreement on the types of assistance on population matters as they related to human rights which international organizations might be requested by Governments to render:

(*a*) Collecting and analysing demographic data (including census-taking registration of vital statistics and publication of laws, judicial decisions and administrative decrees, national and regional),

(*b*) Developing a population policy as an integral part of the national development plan, setting national population targets wherever possible and identifying the measures necessary to meet those targets with full respect for human rights and fundamental freedoms as recognized in international instruments of the United Nations,

(*c*) Providing family planning information and services to all persons who wanted them in accordance with the principles set forth in resolution XVIII of the Teheran International Conference on Human Rights (General Assembly resolution 2442 (XXIII)), Economic and Social Council resolution 1672 A (LII) and other relevant provisions,

(*d*) Including material on family life and population dynamics at all levels of the educational system, including adult education;

(*e*) Research on various population problems, which should include research by competent United Nations organs on the interrelationship between population trends and human rights,

(*f*) Training of the personnel needed for all aspects of population policy, such as demographers, lawyers, doctors, health and social workers, educators and administrators, such training to impart an adequate knowledge of human rights according to international standards and an awareness of the human rights aspect of population problems,

(*g*) Reviewing national legislation in the light of both population policy and human rights;

(*h*) Establishing or strengthening national institutions to develop, implement and evaluate population policies and programmes, and ensuring that such functions should be carried out with the active participation and under the control of the persons and groups involved or their representatives Reviewing judicial and administrative procedures to ensure that they should afford effective protection of all the human rights connected with population problems, including protection against all forms of discrimination

151 The performance of those and other services to Governments would require a significant increase in budgetary support for the relevant programmes at the national, regional and international levels.

152. The Symposium recommended that an international agency should be entrusted with the representation of migrants for the protection of their rights, vis-à-vis national authorities.

153. Most participants were of the opinion that it would not be necessary to create a new international agency to deal with population problems. The need was rather for strengthening existing institutions and for better co-ordination of their activities. There was need for closer co-operation among UNDP, the Population Division, the Human Rights Division, the Centre for Social Development and Humanitarian Affairs, UNFPA, UNICEF, the regional economic commissions, the specialized agencies, particularly the ILO, WHO, FAO, UNESCO, and IBRD, the regional development banks, and the regional demographic centres. Non-United Nations intergovernmental agencies, such as the European Community, OECD and regional organizations in the developing world, also had an important role to play in multilateral population programmes. Learned societies, such as the International Union for the Scientific Study of Population (IUSSP) and the Committee on International Co-ordination for National Research in Demography (CICRED), also had useful parts to play.

154. It was generally considered that effective international efforts concerning population in its relationship with human rights should also involve non-governmental organizations to the fullest extent. Some private agencies might be permitted by Governments to carry out certain population programmes. International professional associations, such as those of doctors, lawyers, demographers, economists and social workers, could make significant contributions, especially in the elucidation of the human rights aspects of population matters. Much more should be done to involve religious organizations to whom millions of persons looked for guidance on questions of private morality and family life.

155. Some participants were of the view that the need for action to reduce fertility was particularly urgent in certain countries because of the enormous momentum built into current population growth rates. In the opinion of those participants, international agencies should assist those Governments on request to carry out voluntary family planning programmes as an integral part of national development plans and with full respect for human rights and fundamental freedoms. Other participants stressed that in their view international organizations should formulate and carry out integrated and comprehensive programmes in the field of population without singling out any particular aspect.

156. It was generally agreed by the Symposium that the United Nations should promote population policies not as an end in themselves, but as a means of advancing the great objectives of the Organization, namely, peace, economic and social development and human rights. It was also recognized that development could do as much for population policy as population policy could do for development. Measures to improve, for example, education, health services, nutrition, employment and women's and children's rights were desirable not only in their own right; they also assisted in the solution of population problems. Therefore, the United Nations and other international organizations should be especially concerned with development, population policies and human rights as interrelated matters of common interest to all countries. All aspects should be integrated in a comprehensive international approach towards the achievement of international co-operation in solving population problems and in harmonizing the actions of countries for the promotion of human rights and fundamental freedoms for all.

Appendix

AGENDA

1. Opening addresses
2. Appointment of officers
3. Adoption of agenda
4. Fertility and human rights
5. Mortality and human rights
6. Internal migration and human rights
7. International migration and human rights
8. The implication of population trends for the formulation and exercise of human rights
9. The roles of the community, State, international organizations and other institutions in safeguarding and promoting human rights in the light of population trends
10. Formulation of concepts and other action required to safeguard and promote human rights in the light of population trends
11. Adoption of the report
12. Closing of the symposium

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